DOCUMENT RESUME

ED 328 233 IR 014 832

AUTHOR	Feinstein, Benjamin, Ed.; Kurshan, Barbara, Ed.
TITLE	Telecommunications in Education: Learners and the Global Village. Proceedings of the International Symposium on Telecommunications in Education (Jerusalem, Israel, August 21-24, 1989).
INSTITUTION	International Society for Technology in Education, Eugene, OR.
PUB DATE	Aug 89
NOTE	453p.
PUB TYPE	Collected Works - Conference Proceedings (021)
EDRS PRICE	MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS	Distance Education; Educational Strategies; Elementary Secondary Education; Evaluation Methods; *Global Approach; *Information Technology; *Program Implementation; *Telecommunications

ABSTRACT

This conference focused on national and international networks that currently exist, the use of telecommunications to facilitate projects, distance education, and teacher communication, and current and future trends of communications technology applications in education. The papers are divided into three sections: (1) Telecommunications Projects, including Apple's A.G.E. Project, International Business Machines' (IBM) Pluto and Deadalus Projects, and Tandy's WorldLink, as well as many innovative projects in rural areas, small school districts, and developing countries (36 papers); (2) Implementation and Instructional Strategies, including papers describing project development and delivery in Canada, Israel, Denmark, Australia, the United States, and other countries (22 papers); and (3) Evaluation of Telecommunications Projects, including a look at the AT&T Long Distance Learning Project, and a procedure for evaluating local area networks in Sweden (5 papers). Some papers include their own bibliographies. A List of Contributors and an Author Index conclude the document. (DB)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED328233

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☐ This document has been reproduced as received from the person or organization originating it.
☐ Minor changes have been made to improve reproduction quality.

- Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

PROCEEDINGS OF THE

International Symposium on

TELECOMMUNICATIONS IN EDUCATION

Learners and the Global Village

Jerusalem, Israel, August 21-24, 1989

Editors: Benjamin Feinstein & Barbara Kurshan

INTERNATIONAL SOCIETY FOR TECHNOLOGY IN EDUCATION
ISTE

IR014832

"PERMISSION TO REPRODUCE THIS MATERIAL IN MICROFICHE ONLY HAS BEEN GRANTED BY
David Moursund

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

PROCEEDINGS OF THE

International Symposium on

TELECOMMUNICATIONS IN EDUCATION

Learners and the Global Village

Jerusalem, Israel, August 21-24, 1989

Editors: Benjamin Feinstein & Barbara Kurshan

INTERNATIONAL SOCIETY FOR TECHNOLOGY IN EDUCATION

ISTE

INTERNATIONAL SYMPOSIUM COMMITTEE

Symposium Chairperson: Benjamin Feinstein - Israel
Internat. Program Chairperson: Barbara Kurshan - U.S.A.
Workshops Chairperson: John Cameron - Canada
Panels Chairperson: Betty Collis - The Netherlands
Exhibition Chairperson: Gideon Goldstein - Israel
ISTE Co-President: Paul Resta - U.S.A.

Bengt Bengstsson - Sweden
Moshe Cohen - Israel
Daniel Davis - Israel
Judy Eber - Israel
Jorge Grunberg - Uruguay
Erich Neuwirth - Austria
Elad Peled - Israel
Hillel Weintraub - U.S.A.
Colin Harvey - Canada

LOCAL ORGANIZING COMMITTEE

Gedaliahu Zilberberg - **Chairperson**
Shimon Bukshpan
Gideon Goldstein
Laurin Lewis
Sara Novenstern
Jean Vermel
Alan Eber

Published by: **ISTE**

THE INTERNATIONAL SOCIETY FOR TECHNOLOGY IN EDUCATION
University of Oregon, 1787 Agate st. Eugene, OR 97403-9905, USA

ACKNOWLEDGEMENTS

The editors gratefully acknowledge the assistance of:

OVERSEAS CONTRIBUTORS

- **Dialog's Classmate**. Contact: Anne S. Caputo
  Dialog Inform. Services, Inc., Classroom Instruction for the Dialog, 1901
  North More St., Suite 500, Arlington, VA 22209,USA

- **GTE Education Services, Inc.**, Contact: Peter Grunwald
  2021 K Street NW, Suite 215, Washington, DC 20006, USA

- **IBM International Education Center** - Europe
- **IBM Corporation, Educational Division** - USA

- **Nelson B. Heller and Associates**, Contact: Nelson B. Heller
  707 Skokie Blvd., Suite 600, Northbrook, IL 60062, USA

- **OPTEL Communications, Inc.**, Contact: Abe Zelkin
  322 Eighth Avenue, New York, New York 10001, USA

LOCAL CONTRIBUTORS

- American Embassy, Israel
- Bezek - Zahav Ltd
- El Al Israel Airlines
- IBM - Israel
- International Ltd., Israel
- ISPAR-SONY
- Ministry Of Education and Culture
- Ministry of Tourism
- Olivetti-Delta Traiding Co. Ltd.
- The British Council
- Yeda Computers and Software Ltd.
- Israel Association for Computers in Education- S.I.G. of
  The Information Processing Association of Israel

TABLE OF CONTENTS

INTRODUCTION 9 - 22

Proceedings Introduction
Barbara Kurshan and Paul Resta 9
Technologies for Learning at a Distance
Linda G. Roberts 13
Use of Information Technology Across the Curriculum
Gordon Jones 14

CHAPTER I : TELECOMMUNICATIONS PROJECTS 23 - 252

Doors: Distributed Off-line Retrieval System
Adi Abir and Dov Winer 25
Using a Data Base as a Tool for Research Projects For Sixth Grade
Miryam Alter 31
Project B.R.N.- Baldwin Educational Network
Ralph Annina 39
Using Low Tech for High Tech Results
Kent Applegate, Bill Morgan and Clancy Wolf 49
European Programme For Advanced Continuing Education -Euro-Pace
Jacques Bieber 56
Department of Defense Dependents Schools On-Line Simulations
and Courses with the University of Michigan
(Distance Learning) - Setting the Stage
Sam Calvin 61
The Educational Telematic Network of Catalonia (XTEC):
Functional Characteristics and Structure
Jordi Castells and Guillem Carreras 67
Telecommunication in Education: Not Only for Pupils.
Teachers Deserve its Help Too
Moshe Chasid 72
Telecommunications as a Tool to Improve Teaching/Learning
of Agro - Biological Sciences
Amos Dreyfus and Benjamin Feinstein 76
The Apple Global Education Project
Martin Engel 82

Computer Pals Across The World Project. A Bottom - Up Approach To Telecommunications In education
David K. Chapple 88

The Worldlink Project
Willam D. Gattis 93

Desk Top Publishing" and "Desk Top Video" as Instruments in Dealing with the Flow of Information and Knowledge in Schools
Zvi A. Halbrecht 99

Evaluation of Inter-Active Video in Terms of Effective Teaching
Nico de Jager 101

Edushare - A Telecommunications-Based System for Educators Sharing Information about Instructional Uses of Computers
Hava Laor 106

Connecting Kids: Telecommunications in the Science Classroom
Cecilia Lenk 114

"North Star Bubble" - Galilee Science Education Network
Uri Marchaim 119

The Global Education Model (GEM) and the New York State US/Soviet School Program
Chris Morton, Charles Mojkowski,
Mark Roland and Peter Copen 125

The Pluto International Networking Project
Norman Longworth 136

Global Education Telecommunications Network
Sheila Offman Gersh 140

Computer-Mediated Writing and the Writer in Electronic Residence
Trevor Owen and Ritz Chow 148

The Function of a Telematic Host Computer in a Training Environment: The Example of the Cleo
Maryse Quere and Bernard Schmitt 154

The Electronic Class
Joseph Regev 160

The Integrated Virtual Learning & Working Place
Mette Ringsted and Niels Christian Nielsen 166

At-Risk Populations--On-Line Solutions
Lynne Schrum 174

First of All, Local Networks
Richard Shor 182

European School Project (ESP), Teletrips in European Context
Henk Sligte 186

Telecommunications: A Tool for Reconnecting Kids with Society
Margaret Riel 193

Spacetime Physics: A College Course Team-Taught
On Bitnet for Academic Credit
Richard C. Smith 202

Learning Link - A Public Telecommunications System of
Regionally-Based Information Services For Educators
Robert Spielvoge and Erica Marks 209

Tea-Net Texas Education Agency Electronic Communication
Network Model District project
Connie Stout 211

Chimo: A Milti-Faceted Communications Environment for Education
Jo Ann Wilton 218

Makash: A Computer Communications Project for the
Advancement of Education & Community - A Progress Report
Dov Winer, Rimon Levy and Hermon Graif 226

Jewishnet (sm): A Microcomputer Educational Network
between Jewish Centers in Israel and the Diaspora
Dov Winer 230

The Interactive Communication Simulations:
Activating the Potential of International Networking
Clancy J. Wolf and Israel M. Porat 236

The International Group Work: How a Computer Conference
Can Invigorate Teaching and Writing
William W. Wright 244

CHAPTER II:
IMPLEMENTATION & INSTRUCTIONAL STRATEGIES 253 - 412

Networks & Technology in Environmental Education:
A Strategy for Introduction of Information
Technology in Ordinary Classroom Practice
Ove Biilman 255

Project Special Link: A Telecooperation Based Community Learning Environment Fostering Academic and Social Development, Among People in Homes, Schools, Libraries, Hospitals, and Other Learning Environments

John Cameron 262

Telecommunications & Equity: Using a Telecommunications Network to Enhance and Manage a State-Wide Equity in Technology Project

Alice Fredman 267

Learning the "Write Stuff" through Computer Technology

Debra Freedman and Jerry Stimmel 275

Modems, Distance and Computed Assisted Learning

Manfred Hanke 284

Online Education: A New Domain for Collaborative Learning and Communication

Linda Harasim 289

Distance Learning in the Caribbean

Dennis Harper 290

The Electronic Academical Village: Creating Proximity Electronically for Culture Building

Judith B. Harris and Glen L. Bull 292

Integrating Telecommunications into the Total Learning Environment: One International School's Approach to Using Telecommunications in the Classroom and on Campus to Further the Development and Use of Educational Computing

Robert M. Hilgenfeld 299

The Daedalus Project: Writing and Telecommunications

Kathleen M. Hurley 305

Going Online: A Magnetic Highschool Experience

Erica K. Lodish 313

Interschools Communication

Nina Lund 321

Data Communications - A Means to an End

William Newman 328

NASA Distance Learning Projects in Education

William D. Nixon 334

Telecommunications in Education in Developing Countries

Jaime Prilusky 342

Educational Communications: The Good, Bad and the Ugly
Paul P. Resta and Barbara Kurshan 347

Telecommunication: Connections to the Future
Margaret Riel 355
FrEdMail: Free Educational Electronic Mail Network
Al Rogers 369
Language Attitude Change of Students in U.S. Upper Elementary Bilingual Program Classrooms Participating in Computer-Based Exchanges with Puerto Rican Sister Classes
Dennis Sayers 378
Ten Hot Tips for teaching Telecommunications in the Schools
Len Scrogan 386
Hyper-Postcards (TM): Linking Students Globally Through Multimedia Communications
Gerry Sinclair 388
Election '88 Telecommunication Project
Connie Stout 396
Building Bridges: Kentucky to Kyoto
Hillel Weintraub 403

CHAPTER III:
EVALUATION OF TELECOMMUNICATIONS PROJECTS 413 - 442
The Use of Audiographics in Delivering Distance Education Programs
Terry Boucher 415
Evaluation of Telecommunications-Based Education: What to Evaluate ?
Jeff Charles 421
The Bulletin Board Software Evaluation Instrument: A Survey of Leading U.S. Educational Telecommunications Experts
Steven Isom 432
Possible Consequences of Electronic Networking for Education
Erich Neuwirth 438
Evaluation of Local Nets for Upper Secondary Schools
Goran Nydahl 442
List of Contributors 449
Author Index 453

INTRODUCTION

PROCEEDINGS INTRODUCTION

Barbara Kurshan, Educorp, Paul Resta, University of New Mexico, U.S.A

The growth of telecommunication networks and projects is changing the image of the classroom for the 1990s. The global classroom of the future will be connected by networks that reach cross the globe, across ages and across subject areas. Students and teachers will learn from each other and will together solve problems. In August, 1989 the International Symposium on Telecommunications in Education addressed the issues related to "Learners in the Global Village". This document includes the proceedings of the symposium which was sponsored by the International Society for Technology in Education and the Israel Association for Computers in Education in Jerusalem, Israel.

These proceedings provide useful information on:

- national and international networks that currently exist
- the use of telecommunications to facilitate cooperative projects between classrooms in remote locations; networks as delivery systems for distance learning; teacher training; access to information resources; and teacher communication for sharing ideas, problems and solutions.
- current and future trends in the application of the of the new communication technologies in education.

This symposium was particularly timely because of the rapid changes that are taking place across the globe. In recent years, we have all witnessed the remarkable breakthroughs in science and technology leading to an explosion of knowledge. It is now estimated that the total knowledge of mankind currently doubles every 7-8 years. At present, over 2,000 books are published daily and the rate of production of information continues to accelerate!

The rapid developments in fields such as biotechnology, medicine, space science, telecommunications and new materials are moving us from a world society based on raw materials and production to one increasingly based on human resources and knowledge. At the same time, the world is presented with an array of problems of unprecedented complexity. In fact, a number of scientists have asserted that perhaps for the first time in history, mankind is confronted by a widening gap between the complexity of world problems and the intellectual power of individuals and societies to solve them.

Concurrently, our world is growing ever smaller and more interdependent. As noted by Capra (1985), "We live today in a globally interconnected world in which biological, social and environmental phenomena are all interdependent...we need a fundamental change in our thoughts, perceptions and values".

The interconnectedness of the world extends beyond our biological and economic systems to our fields of inquiry. We increasingly recognize that most of our world's problems do not neatly reside within a single academic discipline or field of inquiry, rather they span across many of the artificial boundaries of knowledge we have established and institutionalized within our universities and schools.

Lastly, our interconnectedness is manifested in the growth of the world's communication systems. We are now able to witness events as they take place in countries around the world. For example, a friend who lives in the San Francisco area was amazed that the first calls he received were from friends in Europe and Japan who were concerned about the effects of the earthquake on his family. They had witnessed the earthquake on television almost minutes after it had happened.

Now that we are becoming aware that our interconnectedness will be central to the survival of our small planet it is necessary for us to rethink and restructure the way we have been doing things.

In the Soviet Union, the United States, and many other nations, there are shared views on the need for restructuring our educational systems. Educators are more aware of the need to develop a new vision of education for the 21st century, a vision that will assure that students will have:

- the skills and knowledge needed to contribute to the economic and cultural development of their respective nations in the respective nations in the new information age.
- an awareness of the global issues and problems we share in common and an appreciation for the intelectual and cultural richness of other societies.
- the critical thinking and collaborative problem solving skills along with a commitment to work with their peers in other nations to forge new solutions to the growing web of global social, political, economic and ecological problems.

To achieve these goals, we must use all of the best tools and strategies available. The emerging telecommunication technologies represent a powerful tool for linking both students and teachers together, for sharing our knowledge and perspectives and for actually making the "global village" a reality.

The Israel Conference on Telecommunications in Education provided a unique opportunity for the leaders in telecommunications around the world to come together, to share experiences, insights, ideas and research findings on the applications of this new technology to education. Their efforts and leadership clearly suggest that the educational "global village" is not just a remote possibility but something that will become a reality long before we reach the 21st century.

The collective papers included in this document report on these issues and how they fit into the current state of educational telecommunications. The authors are all pioneers in a field that is still in its infancy. The ideas presented in these papers will quickly be surpassed with new ideas and new projects using telecommunications in the classroom. However, the importance of these proceedings lies in its value as a historical record and guide for the new users of telecommunications in the "global classroom".

The papers, discussing telecommunications for education and networks for the global village, are diverse in audience, content and geographic distribution. The papers are divided into three sections: Projects; Implementation and Instructional Strategies; and Evaluation and Research. Projects include those being conducted by large computer companies such as the A.G.E. project at Apple, the Pluto and Deadlus Project by IBM and Tandy's WorldLink as well as the many innovative projects being implemented around the world in rural areas, small school districts and developing countries. Strategies for instruction and implementation are included in papers describing project development and delivery in Canada, Israel, Denmark, Australia, the U.S. and many other countries around the globe. Although evaluation and research data is just beginning to be compiled, several papers explore the plans and results in this area including a look at the AT&T Long Distance Learning Project and a procedure for evaluating local area networks in Sweden.

As you read and evaluate these papers, we hope you will realize the impact of telecommunications on "Learners in the Global Village". This document is the start of an exciting new era for education. Thank you for your support, interest and participation in this exciting exploration of telecommunications in education.

TECHNOLOGIES FOR LEARNING AT A DISTANCE

Linda G. Roberts, U.S. Congress, U.S.A.

Computer and Telecommunications technologies are enlarging our definitions of how students learn, where they realn, and who teaches them. While distance education is not a new concept, today's efforts have changed dramatically in response to new technologies and new needs.

Recent rapid development of technology has resulted in systems that are powerful, flexible, and increasingly affordable. Information technologies are continuing to develop with dramatic speed, increasing the possibilities for distant interaction, as well as giving students access to a wide array of information resources and literally transporting them to the "teaching" site 5 or 5,000 miles away. Distance learning efforts provide new opportunities and challenges for educational systems at the local, state, national and international level. Support and training for teachers, development of appropiate curriculum, establishment of new institutional relationships and partnerships with the private sector are all contributing to successful efforts.

In planning for the future, policymakers at all levels will need to rethink policies and regulations that were designed for traditional contexts and develop creative solutions to meet new educational needs.

THE USE OF INFORMATION TECHNOLOGY ACROSS THE CURRICULUM

Gordon Jones, The Times Network Systems Ltd, UK

Introduction

The advent of the microcomputer in schools, has provided educators with a very powerful tool for use in association with the whole range of curriculum subjects - History to Home Economics, Mathematics to Modern Languages. The use of such technology has enabled the artificial barriers between curriculum subjects to be removed and for much more cross-curricular activity to be evident.

Every curriculum subject involves writing and communication. Every curriculum subject can benefit from the use of Information Technology - computers. Educational standards are rising, students are more highly-motivated and teaching is made easier and more satisfying.

In the UK, various Government-led initiatives during the early-1980s have provided every school with at least one computer - even the smallest rural junior schools. Many larger comprehensive schools, of course, have 50, or more, computers, enabling them to be used more readily in a classroom environment for a wide variety of applications.

It is a vitally important part of the education process for students to be made ready to face the world of work. In any modern office or place of work, the use of personal computers is commonplace. Industry and commerce can reasonably expect for young people to be conversant with such technology and to be comfortable and knowledgeable in its use. This leads on, of course, to many Industry-Education links which - certainly in UK - are now increasing in number and the benefits to both parties are becoming apparent.

As well as the use of computers for word-processing, spreadsheets, simple databases and educational games-playing, it became apparent that great benefit could be obtained by allowing such devices also to be used for communication - between schools, teachers, education authorities, internationally - and for the provision of a wide range of information databases - again, locally, nationally and internationally.

It was with this in mind that, in 1984, The Times - one of the most famous and reputable newspapers in the world - decided to start an electronic communication and information service to schools and colleges. This was termed The Times Network Systems - TTNS for short - and provided a dedicated service to the education community, both in the UK and abroad. In 1988, TTNS joined forces with a smaller service to the education sector operated by British Telecom to form Campus 2000.

Campus 2000 now provides E-mail, information services and conferencing to over 9,000 subscribers - most of which are schools and colleges. At this time, over 60% of all UK Secondary Schools subscribe as well as a wide range of other education establishments and individuals. Campus 2000 also has subscribers in over 20 countries outside the UK, including Sweden, Denmark, Finland, Australia, Japan and many others. This, of course, leads to many interesting international projects and friendships.

It is interesting to note that the Campus 2000 service is supplied to the education sector on a commercial basis by two leading UK companies - British Telecom and News International - thus enhancing industry-education relationships in general.

The use of Information Technology, with fast electronic communications as a key element, has provided many opportunities to education which, hitherto, were just not possible. At a local level, teacher to teacher communication has been made simple and convenient. No longer are there the inevitable, unanswered telephone calls. As a result, there is now a much better 'network' through which teachers can enlist help and exchange good practice and ideas - locally, nationally and internationally. Curriculum issues can be discussed. Self-help is the order of the day! It is easy to find out if anyone else has done work on a specific topic or project idea to avoid 're-inventing the wheel'. Although one cannot pretend that such insular practices have been eliminated, instances have been dramatically reduced.

As far as students are concerned, their uninhibited energy and ideas know no bounds. Maybe because game-playing was the first contact many students had with computers, the 'fun' element persists and acts as a great motivator, even to the more difficult student and the slow-learner.

Training Teachers in IT

The biggest obstacles, of course, to the use of IT across the curriculum lie in the training of experienced teachers and support staff and the level of resource - the availability of computers in the classroom together with associated finance. As we all know, students will happily sit down and play - usually constructively - with a computer, even if they have not seen it before and do not know how to operate it. Eventually, they will find out how to use it effectively by trial and error or, if all else fails, by reading the instruction manual! This behaviour has been observed in very young children- 6 or 7 years old - as well as more senior students.

If you put a teacher into the same situation - particularly someone who has little knowledge of computers or how to use them - a very different result ensues. Some will refuse to have anything to do with such devices, on the grounds that their subject could not possibly benefit! Others profess that they have insufficient time to learn about the technology and how it can be used to support the curriculum. Yet another group believe that if they do something incorrect when using the computer, they may do irreparable damage to it!

In reality, many teachers do not wish to display their lack of knowledge in front of their students or colleagues. This is understandable. Exactly the same attitude is displayed by many middle and senior managers in industry. They also take the view that they are too busy to attend formal training and, anyway, they employ people to do this sort of task for them!

Training of experienced teachers in the use of Information Technology is still a major problem. It must be overcome. It is compounded by the fact that teachers - particularly in the UK - are in very short supply. Taking a teacher out of the classroom to attend external training courses is, therefore, unwelcome and expensive - particularly if a supply teacher has to be employed to cover the shortfall.

A partial solution to this problem, which has already been successfully used in industry, is the use of the training video and associated material. This seeks to provide background training in a way that can be used at the convenience of the individual - during free time or at home. This private and personal form of training also helps to overcome the lack of confidence in the person concerned by not requiring him or her to display their lack of knowledge in front of trainers, colleagues or, worst of all, students. Such a technique may provide just enough knowledge and motivation for a teacher to then seek help from colleagues or to attend formal training sessions with added confidence.

Some Example Projects

Some examples of project activities which have taken place using a range of Information Technology facilities will now be described.

A very early advocate of the use of Information Technology, starting in 1985, was Derbyshire Local Education Authority, in the centre of England. This was led by a very imaginative IT Advisory team which had the full backing of the Education Authority. They set out to demonstrate how IT could be used in support of every curriculum subject. Teachers were seconded - on a day per week basis - to the Advisory team to develop resource materials for their particular subject. These curriculum resource materials were then made available, through a database hosted on TTNS, to all Derbyshire schools.

For instance, one school had a particularly strong English department. Hence, they were commissioned to provide sets of teacher notes and resources for the teaching of the English Literature set books being studied in schools that year. Another school undertook to provide teachers with up-to-date information on In-Service Training opportunities within the education authority. Yet another coordinated the production of a Gazetteer of all the major towns and villages in Derbyshire. This was produced by students and contained their by-line on the piece of information. This, of course, highlights another reason why communications are popular with students - it gives them the opportunity to display their work to a much wider audience than just their class or school. Arguably, this also helps to raise standards overall. After all, none of us like having work on public display which contain errors or is of a poor standard!

In Devon, in the South West of the UK, some Primary schools set up electronic communication links with schools in Tasmania. This was, originally, started as part of a Government initiative - the Microelectronics in Education Project (MEP) - but was later carried on by TTNS.

At first schools got to know each other personally and collectively. They then undertook a range of curriculum-related activities together. This involved, for instance, both sets of schools carrying out surveys into their respective lifestyles, family environments, housing, employment and general locality. This data was then analysed locally on each side of the world. These analyses were then exchanged, thus allowing those young children to compare and contrast life in Devon and Tasmania.

The high-spot of the DATEM project - Devon And Tasmania Electronic Mail - was the visit made to London and Devon by 3 teachers and 6 children from some of the Tasmanian schools who took part. They were excellent ambassadors for themselves, their schools and for Tasmania. While they were in the UK, of course, they were in constant touch with their friends back home - through E-mail - and transmitted a daily diary of what they were doing. In addition, they undertook to answer questions from 'back home' about England, on such deep educational issues as 'how many Porsche cars were there in Oxford Street, London' and 'can you buy Vegemite in English shops'.

Of course, many such projects have taken place since involving widely-separated groups. Examples which have used Campus 2000 facilities include:

England - France:	schools in communication in support of French and English language teaching.
UK - Japan:	understanding the differences between European and Japanese cultures. This was also an exercise in English for the Japanese students. Several such projects are in progress, at least one of which has resulted in a face-to-face meeting.
UK - Sweden	schools in Rotherham, in the north of England, have created a joint database - in English and Swedish - related to their project activities.
UK - Alice Springs	Sadadeen Secondary College in Alice Springs, Australia, joined forces with Shoeburyness, Essex, on a number of projects. Sadadeen successfully 'sold' the idea of them coming to the UK to do a lecture tour, to a number of sponsors who helped to finance a trip to the UK in November 1988. Their tour included several lectures on the benefits of such international electronic communication to a remotely-located school - such as Sadadeen.

Northern Ireland	the Education in Mutual Understanding (EMU) project seeks to bridge the great Catholic-Protestant divide in the Province by putting students into contact with each other to, hopefully, instil better relations into the next generation. Electronic communication is an excellent way of starting down this trail, avoiding the initial embarrassment of face-to-face confrontation. E-mail allows them to get to know each other, which should then lead onto joint projects and meetings.
International	a computer conference was set up to elicit views from young people around the world on their perception of life in 2039 - 50 years ahead. This was at the instigation of BBC TV who are intending to make a programme on the subject, using student views, which have been gathered in this way, as the basis.

The Times Newspaper Day Project

Newspaper Day is now a well-known, international event on Campus 2000. On a designated day, twice a year, schools across the woprld compete to produce the best newspaper, in real time, on a single school day.

This excellent project resulted from an In-Service Training Course, run by an enterprising Advisory Teacher. The course set out to explore the educational disciplines and benefits arising from producing a newspaper. Teachers were only allowed to take part provided that they brought along at least one pupil! From the outset, it was competitive.

TTNS has now run this project as a competition on six occasions, over a 3-year period. Schools must produce the newspaper on a single school day, thus experiencing the tight deadlines to which every daily newspaper works.

To this original idea, TTNS added many elements relating to electronic communications and, importantly, the Newspaper Industry.

* a News Agency (cf. Reuters, AP, AFP) was set up, staffed by students, to monitor the news of the day - through radio, TV, newspapers, newspaper wire services, etc - and to provide a stream of 'Agency reports' electronically to schools taking part. In addition, interviews are set up with well-known TV and Sports personalities, from which articles are produced and distributed.

* a Panel of Judges was recruited, all of whom are very experienced newspaper professionals. Each entry submitted to the competition, was guaranteed to have a brief, critical appraisal of it returned to the school by the judges.

* the help of a sponsor was enlisted to both finance the prizes - normally PCs, cash and books - to host the prizegiving and to produce a pack of information, badges, etc for the school to use during the competition. In return, the sponsor received considerable publicity both nationally and locally on TV and in the Press.

* the Newspaper Society - the UK organisation to which most local and regional newspapers belong - offered to help by telling its members what was going on and to urge them to advise schools in their locality in the skills of page layout, headlining, team organisation and so on.

The results have been of an extremely high standard. Little guidance is given on what schools should use to produce their finished product. Hence, some use simple word-processing packages, paste-up of pages and a photocopier! Others use sophisticated Desk Top Publishing, digitized photographs and diagrams and colour! One school has pursuaded the local newspaper to print 12,000 copies for distribution in the area. This was a 32-page tabloid newspaper, with colour, financed by advertising sold by members of the newspaper 'staff'. They also made a small profit!

On the last occasion this competition was run, in March 1989, 170 schools took part, including 30 schools from Europe. Around 5,000 students took part and, in total, produced 45,000 newspapers.

Newspaper Day - Education Benefits

This project shows Information Technology being used in support of a high-value, cross-curricular activity. Many schools now want all of their students, at the age of 14 or 15, to experience this activity. There are always more schools wishing to take part than can be accomodated on a given day.

Schools see the following benefits for their students:

* working under pressure to very tight deadlines
* working in teams
* leadership, decision-making and delegation
* all students can contribute, regardless of ability
* the satisfaction of producing something to be proud of at the end of an intensive spell of hard work.
* bring together a wide range of disciplines - art and design, creative writing relating to every school subject, editing, analysis, use of IT, interpersonal skills, business studies, photography, etc.

Schools also see considerable benefit for the school in becoming involved in such a project. Through the local newspaper, their efforts can be publicised to the local community, links with industry and commerce can be emphasised through advertising. Of course, if the school wins a prize, the local newspaper can headline 'Local School Wins Prize in International Competition'!

A Public Relations vehicle has been created, inadvertently, for schools to use as they wish. At a time when the UK is undergoing its most radical reforms in the education system, many schools wish to emphasise their excellence in the face of falling roles, school closures and commercially-minded governing bodies. Newspaper Day is one way in which they can achieve such profile.

Newspaper Day - the Future

Several schools already use Newspaper Day as a project both to make money for the school and, also, to give students some insight into running a real business. This they do by sales of newspapers produced and by the sales of classified and display advertising.

Two schools now run a local, community newspaper, produced fortnightly or monthly. These are true commercial ventures. One of these schools - a small rural Primary school in Scotland - earns more from its newspaper activities than it receives in 'capitation' grant from its education authority. This Primary school, incidentally, has totally changed the way it teaches written English as a result of the newspaper. All such work is now oriented toward the newspaper, with little - if any - use of textbooks!

In order to encourage schools to take part in this activity, a video package is being produced to highlight some of the benefits to those schools who have not yet taken part. For the 'experts', some hints and tips will be provided on how to improve current performance. As part of the package, a book is also being produced as further explanation and resource for teachers.

Another interesting development has been an initiative by a Local Education Authority to extend the newspaper concept to Modern Languages. They plan to run a smaller-scale, local Newspaper Day, but with all contributions written in French, German or Spanish. Such local initiatives are to be encouraged in order to extend such project opportunities to as many schools as possible.

Summary

Over the past five years, the use of Information Technology in schools has taken on a new dimension - it is now accepted as a regular tool in support of all curriculum subjects, for all age ranges from infants to senior students.

In the UK, certainly, the value of Government initiatives made in the mid-1980s is now becoming apparent - MEP and TVEI (Technical and Vocational Educational Initiative) in particular.

In some respects, computers have acted as a catalyst in breaking down traditional barriers between curriculum subjects. 'Cross-curricular' and Industry-Education' are the current buzz-words. Such activities will, undoubtedly, help every young person to attain his or her full potential educationally and in later life.

Communications-based projects help young people to understand the points of view and ways of life of students in other countries, perhaps on opposite sides of the world. This can only have a beneficial effect on future generations.

There is a new awareness of what industry and commerce requires from its new recruits, but there still remains much work to be done by both sides.

Education in the 1990s will be about fitting young people for life in the 21st century. In many ways, therefore, the Future has arrived early for many teachers and students, thanks to Information Technology!

CHAPTER I

TELECOMMUNICATIONS PROJECTS

DOORS: DISTRIBUTED OFFLINE-ONLINE RETRIEVAL SYSTEM

Adi Abir - Trendline Inc. (Kav Manhe), ISRAEL

Dov Winer - Makash Inc. ,for Advancing Comp. Comm. in Education, ISRAEL

* DOORS is based on state of the art, low cost mini computers, standard packet switching networks and powerful personal computers.

* All commmunication sessions are transfers of packed and encrypted files. The communication session is terminated immediately upon completion of the data transfer.

* The system is totally user friendly requiring no computer literacy. Complex functions are initiated by the selection of a menu option. The user need learn no more than 6 keys to operate the system.

* All communication procedures - dialing, routing, handshaking etc. are performed automatically by the PC with absolutely no human intervention.

* Expensive resources - those of the central installation and of the commmunication network - are used only for the transfer of data to and from the termi nal unit . Subsequently, the data is displayed, processed, printed and stored utilizing, at no additional cost, only the personal computer's local resources.

* All of the PC's local capabilities may be exploited to their fulles potential. Programs serving the end user may provide graphic displays, sound, animation and complex mathematical computations.

* The system offers complete 2 way file transfer facilities. Files are uploaded as efficiently as they are downloaded.

* DOORS is easily interfaced to external data sources, on the one hand, and to almost any PC application program, on the other.

DATA VALIDATION, ENCRYPTION AND COMPRESSION

The DOORS solution links two powerful processors - a central mini computer and a remote personal computer. These two processors, communicating with each other, can ensure the data's integrity, the information's security and the system's efficiency.

1. All data transfers are validated by DOORS' internal protocols. Erroneous blocks are retransmitted until their correct reception is acknowledged.

2. All the data transferred between a DOORS' central installation and one of its terminal units is encrypted at the transmitting end and decrypted at the receiving end, thus ensuring the information's security. The encryption process uses an algorithm allowing for no more than a one in a billion chance of randomly guessing the correct decryption key. Sensitive data is then encrypted a second time by using a user provided password as the second encryption key.

3. All data is compressed at the transmitting end and expanded at the receiving end. This procedure helps to minimize communication time and enhance the system's efficiency.

Software downloaded through the system is further secured in a way that will render it totally unusable anywhere other than under DOORS. Furthermore, all software is downloaded with an optional expiration date and a maximum usage counter. The software is thus not only secured against unauthorized copying but also limited to a predefined usage period.

USER VERIFICATION AND ACCOUNTING FACILITIES

All queries sent to the central installation are prefaced by an installation supplied user identification number and a user supplied password. Queries containing mismatched passwords are immediately rejected. Sensitive data is protected, at the record level, by a second password which must be supplied by the user. Validated queries, on the other hand, are automatically logged in a log file.

THE END USER'S PERSONAL COMPUTER

DOORS' most sophisticated features were reserved for the end user's PC which was made to look as simple and as unsophisticated as possible. Knowing that most users will be laymen, with little or no computer literacy, DOORS was designed to perform complex procedures prompted only by the user's selection of a menu option. In a typical session, the user will use two or three special keys to point to a menu entry which can then be selected by simply pressing the "ENTER" key. This selection will, unknown to the user, evoke a complicated and multistaged process which will perform the following functions:

1. The PC's magnetic device will be searched for the application software required to perform the desired function. The application software, if found, will be loaded and run.

2. The required software will be downloaded from the central installation whenever the local search has returned a negative result. The downloaded software will be stored on the PC's magnetic device for all subsequent uses.

3. Control will pass to the application software which can then perform any required service such as retrieving data from the central installation, processing and analyzing the information, displaying and printing the data and its derivatives and storing the data for subsequent uses.

The data may be retrieved, processed, displayed, printed and stored either by using specially designed application programs or by using the system's standard data downloading option and evoking any locally available software package, such as a speadsheet, a word processor, a data base query system, an application generator, etc.

The personal computer, whenever needed, automatically dials into the packet switching network, connects to the central installation, transmits the appropriate query, retrieves the downloaded software or data and terminates the communication session.

Currently a Micro-VAX II computer, costing as little as $40,000, can effectively handle queries requiring a return throughput of as much as 6 KBytes per second. This can be translated to as many as 3 average file transfers per second, that is, 180 transfers per minute. If each file transfer will occupy the remote PC for as little as 3 minutes, then, on the average, our single VAX might keep well over 500 concurrent users fully satisfied. This, of course, will not apply to all the concievable applications, but there still are an endless number of applications that are perfectly suited for distributed offline/online processing.

DOORS is based on state of the art mini computers which are annually becoming more powerful and less expensive. Thus the cost effectiveness of DOORS, starting as it is from an amazingly high level, can only increase with time.

INTERFACING WITH THE DATABASE MACHINE

DOORS can, of course, be used as a stand alone system, inputing its data from magnetic tapes, fast, local PC-mini connections and file uploads. Alternatively, the system can be interfaced to other computers, functioning, in this context, as data base machines. A query reaching the DOORS front-end file server is routed to the back-end data-base server. The reply is sent to the front-end machine which uses the DOORS solution to download it to the end user's PC. The two machines can use any one of several interfacing methods - direct communication, LANs, Gateways etc.

THE COMMUNICATIONS NETWORK

Standard, interconnected, nation-wide packet switching networks now enable the establishment of national and international communication and information services. The DOORS communication solution is based exclusively on these standard packet switching networks which are used to their fullest potential in the most efficient manner. The remote personal computer dials into the network and connects with the central installation. The PC's query initiates the downloading of the desired data file which is transferred and received at full line speeds. Immediately upon completion of the downloading operation, the central unit terminates the session and disconnects the virtual communication channel, thereby lowering communication costs to the essential minimum required to actually transfer the data.

DOORS is a very efficient system even at current line speeds. Upgraded packet switching networks, operating at higher line speeds, can only make it more efficient, more cost effective and more applicable.

POSSIBLE APPLICATIONS

- DOORS can be used as a document center for quick and easy retrieval of inter-company circulars, procedures, minutes etc.

- DOORS can be used as a program center housing the most updated versions of all PC programs available to the organization. Remote PCs may download any required program.

- DOORS can be used as a low cost inter-company information center, downloading data blocks to the user's PC where the data can be processed and analyzed using readily available tools such as Lotus or Framework.

- DOORS can be used as a low cost communications center providing multipurpose file transfer services, to and from branch offices, agents, field representatives, etc.

- DOORS may be used to distribute online and historical financial information. Costs are dramatically reduced if the service is slightly downgraded - providing periodic updates (every minute or two) rather than continuous updates.

- DOORS may be used for providing public Videotex-like information services. In this respect, DOORS is far superior to Videotex since it condenses a long online Videotex session into an extremely short online DOORS session.

- DOORS provides large scale and low cost electronic mail services. Letters are written and read at the end user's PC while the central installation is used only as a mailbox and a message router.

- DOORS is ideal for electronic banking applications. Balances and transactions are downloaded to the end user's PC where they may be viewed, analyzed, printed, stored, sorted, merged and inputed into an accounting system.

- DOORS can serve as a courseware center providing access into a vast array of courses and other educational software.

- DOORS might be set to serve as a distribution center for electronic games. End users might lease out the games software, on a weekly or monthly basis, at rates considerably lower than those charged for outright sales of the software.

- DOORS may, in a like manner, be used to lease out expensive but infrequently used software packages.

- DOORS can be tailored to fit the needs of the insurance industry. Field agents can, through lap-top PCs, access the company's data bases, retrieve information on existing policies and forward information on new and updated policies.

SUMMARY OF FEATURES

- DOORS is based on state of the art, low cost mini computers, standard packet switching networks and powerful personal computers.

- All communication sessions are transfers of packed and encrypted files. The communication session is terminated immediately upon completion of the data transfer.

- The system is totally user friendly requiring no computer literacy. Complex functions are initiated by the selection of a menu option. The user need learn no more than 6 keys to operate the system.

- All communication procedures - dialing, routing, handshaking etc. are performed automatically by the PC with absolutely no human intervention.

- Expensive resources - those of the central installation and of the communication network - are used only for the transfer of data to and from the terminal unit. Subsequently, the data is displayed, processed, printed and stored utilizing, at no additional cost, only the personal computer's local resources.

- All of the PC's local capabilities may be exploited to their fullest potential. Programs serving the end user may provide graphic displays, sound, animation and complex mathematical computations.

- The system offers complete 2 way file transfer facilities. Files are uploaded as efficiently as they are downloaded.

- DOORS is easily interfaced to external data sources, on the one hand, and to almost any PC application program, on the other.

USING A DATA BASE AS A TOOL FOR RESEARCH PROJECTS FOR SIXTH GRADE AND UP

Miryam Alter, Manhattan Day School, U.S.A.

A data base is a unique tool for use with a research project. The need to set up categories in order to create the data base forces the user to organize the data he wants to compile or has compiled. Since he can always add categories, he is not limited in his choices. Most research projects on the elementary school level are just fact gathering projects where the researcher gains only from the information he has gathered. The data base allows the student to benefit from the research of his classmates. Most importantly it allows for analysis of the data gathered.

This paper describes in detail the use of a data base to study modern Israel. I have used this project on a sixth grade and eighth grade level. At the end of the paper I give a brief description of two other data base projects, one on an eighth grade level and the other on a graduate school level.

Using A Data Base To Study Modern Israel

As computer teacher, I wanted my eighth graders to learn the use of a data base. As a teacher in a Yeshiva day school, I wanted my eighth graders to learn about modern Israel. The "Israel Database Project" that I am about to describe accomplishes both goals.

Elements of the project are: defining categories of research, practice with a data base software, actual research, a pictorial representation of parts of our research, creation of the data base, and a culminating activity that uses the data base as a research tool. I used the Appleworks data base for the project with the Apple IIe computer.

I introduced the Israel Data Base Project to my eighth graders by telling them we would be travel agents studying Israel. We would use a data base to help us compile and evaluate data about Israel.

We discussed what a data base is. One student suggested that a data base be called an "electric almanac." We envisioned a data base about the class. What facts would we want to know about each other? While suggesting possible questions, I explained that for a data base category we would be restricted to one or two words. I emphasized that each person's data would become a data record and each record would have the same categories.

Each student received two places in Israel about which to do their research. We created wall size maps of Israel displaying the places in Israel we were studying. After the actual research each student affixed an index card illustrating some important attribute of the place.

The students compiled the following list for attaining information about Israel:

1) Jewish National Fund
2) Jewish Agency
3) Israel Tourist Bureau
4) Israeli Consulate
5) Travel agents
6) Guide books
7) Encyclopedias
8) School library
9) Talking to people who have visited Israel

We had a brainstorming session to define the categories for exploration. The topics we chose for the data base were: Name; origin of name; year established; location; type of place; highest temp.; lowest temp.; months of rain; general climate; size; pop/Jews, Arabs; archaeological sites; religious sites; museums; parks; beaches; general interest places; major industries; shopping centers.

It was now time to start exploring how to use the Appleworks Data Base. In order to practice using the data base, I created a town called "Menchville, U.S.A." I created a data base about the inhabitants of Menchville and developed several questionnaires about the town. Each questionnaire required a different data base skill to answer the questions. (See attached.)

The following is the sequence I used for teaching the data base:

1) Teach and review -- booting Appleworks, retrieving the "Menchville" data base, browse through records, explain the Open Apple - Z and the ability to "zoom" between individual records and the entire list.

2) Teach and review the "Help" menu with special emphasis on sorting (Open Apple/ A) and selecting (Open Apple/F or Open Apple /R).

I encouraged the students to take notes about the sequencing of steps for using Appleworks. I wrote a concise list of instructions for teachers to use. After completing the questionnaires, the students were quite expert in using the Appleworks data base.

Each student created a data base containing two records, one for each place he researched. Many students really enjoyed reading and then typing directly into the data base. Others still felt they must take notes with pen and paper first and then transfer the information to the data base. Using the clipboard capability of Appleworks, we were able to combine each individual data base into one data base containing all the students records. More advanced students worked on printing the data base.

When the data base was finished, each student was given a list of questions to answer about Israel using the data base. Each was asked to pick five places and create a map showing the best travel route linking the places. In this way students benefited not only from their own research, but were able to use the research of their classmates.

Here are some successful follow up activities:

1) Have an Israel Fair where each student or team of students sets up a booth depicting the places he studied in Israel for the data base.

2) Older students might want to create a computer game where the user would need the data base to answer the questions in the game.

3) Students can put together a travel log or poster depicting their ideas of a tour of Israel.

Today more than ever, Yediat Ha'aretz and Ahavat Ha'aretz are connected themes. The Israel Data Base Project fosters knowledge of Eretz Yisrael, while at the same time teaching and improving computer skills, and hence is a significant project for our Jewish Day Schools.

Using A Data Base To Study Our Heritage

The "Heritage Data Base Project" is an excellent project for seventh or eighth graders. Young teens, as they continue their quest for self discovery, are beginning to be interested in their roots. This data base project researches the origins of the class. Each data base record contains the student's birthplace, parents' birthplaces, maternal and paternal grandparents' birthplaces, number of relatives lost in the Holocaust, number of relatives living in Israel, and the places relatives live in Israel. Students need about a week to compile the information and record it into the data base.

Some simultaneous activities are:

1) Display a map of the world. Using three different colored stickers, allow each student to put up a yellow sticker where he was born, red stickers where his parents were born, and green stickers where his grandparents were born.

2) While each student is compiling his information, have him ask a grandparent to tell one childhood story. Have the students word process these stories and compile a book, "Stories Our Grandparents Told Us...."

3) Have the students fill out a questionnaire about the class using the data base as the resource. Use the questionnaire to create statistics about the class' origins. (i.e. What percent of the class was born in N.Y.?) Have the students create graphs illustrating the statistics. (Easy Graph is excellent

for this!)

Using A Data Base In A Child Study

At the Bank Street Graduate School Of Education, most students agree that the Observation and Recording class is one of the most difficult courses to get through. One must organize about twenty to thirty observations of a child, looking for common threads in different situations. This year we used a data base to help students organize and analyse their observations. The categories they used were: date, setting, child's appearance, movements, emotions, and interactions. Most agreed this was an excellent tool for finding similarities and differences in the child's behavior in different settings. Many also said this format prompted them to test different theories of behavior. For instance, "The child is quiet only during a group activity." One need only use the "find" function with the word "quiet" to test the validity of this theory. Most students said that the data base helped them zero in on what they wanted to get out of an observation.

USING THE APPLEWORKS DATA BASE

BOOTING THE DISK

1) Put the start up side of the disk into the disk drive.

2) Turn on the computer.

3) When the computer gives you a message to put in the program disk, take out the disk, flip it over and press return.

4) Press return or type the date.

5) Choose option 1 - "Add files to desktop."

6) If you are starting a new data base do the following:
   a) Choose "Make a new file for the data base" - option 4.
   b) Choose - "From scratch" option 1.
   c) Type in the name of the data base.
   d) Type in the categories for the data base.
   e) Type in the records.
   f) Save

7) If you are retrieving a previously designed data base do the following:
   a) Choose "Get files from the current disk" - option 1.
   b) Follow the sequence of disk swapping to get your file.
   c) Open apple - I, to insert new records.
   d) When you are finished inserting new records, Open apple /A to sort the new records with the old.
   e) Save

8) **To save** - open apple - S

9) **To print** - open apple - P

Special Functions

Open Apple - Z gets you in and out of the individual records

Open Apple - A sorts on the field you have the cursor on

Open Apple - F finds a particular word in the data base

Open Apple - R finds a particular word in the specified category only

Tab gets you across the data base for left to right; Open apple - tab gets you across from right to left.

```
File:   MENCHVILLE                                                                                          Page 1
Report: mench
NAME    ADDRESS                FAN PROFESSION    BIRTHDATE HOBBY            COLOR HAIR   FOOD
------- ---------------------- --- ------------- --------- ---------------- ------------ -----------
ALEX    55 BROAD ST.           NO  TEACHER       Sep 30 48 SWIMMING         BROWN        SALAD
BELLA   54 MOON DRIVE          YES POET          Dec  4 52 TENNIS           RED          CHOLENT
BILL    2 PEABODY STREET       YES ENGINEER      Dec  5 33 ROCK MUSIC       BROWN        TORTILLAS
CAROL   33 KEAP ST.            NO  OFFICE CLEANE Feb 13 32 GARDENING        BLONDE       PIZZA
CHARLIE 14 SOLAR LANE          NO  PILOT         Feb  6 29 TENNIS           GREY         ICE CREAM
DENISE  67 RALEIGH PLACE       YES MUSICIAN      Aug 30 34 SCUBA DIVING     GREY         PIZZA
FRANCIS 23 FOREST STREET       NO  BANK TELLER   Jun  9 49 READING          GREY         TEA
GIGI    12 RUFUS STREET        YES MAIL CLERK    Jan  3 53 GARDENING        BLONDE       HAMBURGER
HOLLY   45 TORY STREET         YES PHONE OPERATO Apr  5 62 SEWING           BLACK        MEAT BALLS
HOPE    55 NATURE DRIVE        YES PHOTOGRAPHER  Feb  5 55 SKIING           RED          PIZZA
JACK    23 SHELLBY ST.         YES TAILOR        Jan 15 33 T.V.             BROWN        CHICKEN
JANE    45 ROYAL LANE          NO  PILOT         Dec  5 49 GARDENING        BLACK        DIET PEPSI
JANET   45 CARTON ROAD         YES STOCK BROKER  Aug 25 30 TRAVEL           GREY         TOFU
JASON   74 RUBY LANE           NO  RACE CAR DRIV Oct  5 65 JOGGING          BROWN        BROWN RICE
JIM     45 GORGY STREET        YES DISC JOCKEY   Jan  5 60 CLASSICAL MUSIC  BLACK        RICE
JOE     76 RUTERFORD LANE      YES ACCOUNTANT    Mar  7 55 SCULPTORING      BROWN        TURKEY
JOHN    11 FORDAM ST.          YES ATTORNEY      Oct 25 45 PAINTING         RED          ASPARAGUS
JOSEY   88 LOVELY DRIVE        NO  ARCHITECT     Nov  6 48 SCUBA DIVING     RED          LATKES
SARA    54 HARVARD RD.         YES DOCTOR        Oct 15 40 SKY- DIVING      BROWN        CHICKEN
SUSAN   56 LAURIE STREET       NO  SALESPERSON   Jul  6 66 BASKETBALL       RED          TACOS
```

```
File:   MENCHVILLE                                                                                          Page 1
Report: mench
NAME    COLOR        BIRTHPLACE                          AILMENTS
------- ------------ ----------------------------------- ----------------------------------------------
ALEX    GREEN        S. MENCHVILLE                       EAR ACHES
BELLA   PINK         S. MENCHVILLE                       STOMACHE ACHES
BILL    BLACK        CAROLINA                            DEAF
CAROL   BLUE         MENCHVILLE                          BACK ACHES
CHARLIE BLACK        DUBLIN                              OVERWEIGHT
DENISE  GREEN        S. MENCHVILLE                       OVERWEIGHT
FRANCIS BLUE         MONTREAL                            MYOPIC
GIGI    BLUE         GEORGIA                             SWOLLEN ANKLES
HOLLY   BLUE         VIRGINIA                            HIGH BLOOD PRESSURE
HOPE    GREEN        S. MENCHVILLE                       NONE
JACK    BLUE         BRAZIL                              ARTHRITIS
JANE    YELLOW       WYOMING                             UNDER NOURISHED
JANET   PURPLE       MENCHVILLE                          UNDER WEIGHT
JASON   PURPLE       MENCHVILLE                          TORN LIGAMENTS
JIM     BLACK        MENCHVILLE                          OVERWEIGHT
JOE     BLACK        NEW YORK                            MYOPIC
JOHN    PURPLE       MENCHVILLE                          BALD
JOSEY   BLUE         MENCHVILLE                          DRY SKIN
SARA    BLUE         FLORIDA                             HEARTBURN
SUSAN   BLUE         FINLAND                             OVERWEIGHT
```

MENCHVILLE QUESTIONNAIRE

1) How many people live in Menchville?

2) Name four different professions of the residents of Menchville?

3) Who lives on Ruby Lane?

4) Whose birthday is October 25, 1945?

5) Name the person whose hobby is T.V.

6) What kind of doctor should Joe see?

7) Where does Jane live?

8) You are preparing meat balls with brown rice for dinner. Whom would you invite from Menchville?

9) On what continent was Jack born? Check the Almanac or Atlas.

10) Look at the records of Jason, Carol and Alex. Could anything they do be a reason for the ailment they have? Explain!

11) Would anyone in Menchville need a toupee or a hearing aid?

12) Would anyone in Menchville be able to get a job in Macy's?

13) Who might have an album of Michael Jackson in his house?

14) Who might have a subscription to "Traveler's" Magazine?

15) One resident of Mencville has never been to a doctor. Who is this lucky resident?

Part II Menchville, U.S.A.

You are the Govenor of Menchville. How would you handle the following issues?

1) You have been given money for a baseball field to be built in one corner of Menchville. Which corner would you choose and why?

2) Weightwatchers wants to start a group in your town. However, they will only start a group if 20% of a community or more are overweight. Will you advise them to start a group? Why?

3) Your cousin, an interior designer, wants to relocate his business to Menchville. He wants to know what color fabrics he should bring. What would you suggest and why?

4) You've been asked to give a paper at the Governors' Convention about the history of Menchville. To which neighborhood would you go to interview people on the subject? Explain your choice.

5) You are financing a spicy fast foods restaurant. Which one of the "Main" thoroughfares would you choose for your business? Explain.

6) You want to start a center for the arts. Whom would you appoint to a committee to study this possibility? Why did you choose these people?

7) Your old high scholl friend, Jamey, wants to move to Menchville. He wants to live on a block with people who share his interests. What block would you suggest and why?

Here are Jamey's statistics:
Baseball fan: No
Profession: Pilot
Bithdate: July 12, 1946
Hobby: Classical Music
Color Hair: Brown
Favorite Food: Chilli
Favorite Color: Orange
Birthplace: S. Menchville
Ailments: Heartburn

8) Give Jamey an address and insert a record into the data base for him.

PROJECT B.E.N. - BALDWING EDUCATIONAL NETWORK

Ralph Annina, Baldwin Public Schools, U.S.A

A. NEEDS STATEMENT

Telecommunications is having a great impact in our schools today. Students and teachers can now access information services and data bases using a microcomputer and a modem connected to a phone line. The district or central offices or individual schools can send electronic mail and bulletins.

The Baldwin School District is located in Nassau County on Long Island. It is approximately twenty miles from New York City, on the south shore, midway between Rockville Centre and Freeport on the Long Island Railroad line. The district measures approximately 4.3 square miles and has a current population of just under 34,000 residents in 11,000 dwellings.

The Baldwin School District is the fourth largest in Nassau County with a total enrollment of 5,261 and a staff of 409 faculty and administrators.

The Baldwin School District has seven elementary schools, one junior high school housing 879 seventh and eighth graders and Baldwin Senior High School with an enrollment of 1975 students from ninth through twelfth grades.

Baldwin Schools has planned to successfully implement this Electronic Mail and Bulletin Board System linking the seven elementary schools, the Junior High School and High School to the District central office.

The scope of this system is not limited to electronic mail and bulletins. The system fully utilizes telecommunications by offering administrators, teachers and students an innovative means of searching for and gathering information in order to ameliorate the decision-making process and change the way schools communicate. Project B.E.N. will allow all participants to learn how to use a computer to send and receive electronic mail (E-Mail). All personnel involved will also learn telecommunications concepts as well as the uses of terminal software.

For example, a school that must make a hardware or software purchasing decision can access "B.R.S." in order to gather data about exemplary products. School personnel can also leave correspondence for out-of-town organizations using Easy-Link. Baldwin School is currently using the B.R.S. in the libraries. B.R.S. will be demonstrated in the Staff Development/Training component.

The Network software "Networks II" must be properly set-up in the hard disk. This will be achieved by using a consultant to properly format and initialize the hard disk. The long range goal will be to connect two other Apples to the network by way of a L.A.N. (Local Area Network) at the District Office. Project B.E.N. can be considered a Wide Area Network or W.A.N.

D. EVALUATION

At the completion of this project, there will be in place a network for electronic mail and bulletins used by selected personnel in each of the district's schools. The person responsible for the completion of the project will be the Project Coordinator, District Director of Computer Education and Services. An independent evaluation will be conducted by Dr. Robert Signorile of the Polytechnic University of New York. In order to monitor the use of the participants, the network software, Networks II logs all messages received and to whom they were sent to along with the date of transmission. The software has two security levels and sensitive data such as student records will not be transmitted. The system operator (Project Coordinator) will log all the messages in order to determine its use each day. The system will be operational every school day from 8:00 A.M. to 5:00 P.M. The message log will be kept and on-going feedback from participants will be elicited vis-a-vis planned meetings of the District Computer Advisory Council.

E. BACKGROUND INFORMATION

The writer of this grant has developed district wide networks such as the Electronic Mail and Bulletin Board System for District 27 in New York City. This is an active working model. He also has extensive experience in LAN's and WAN's. Baldwin Schools has developed a Computerized Educational Management System (CEMS) that will be phased in within the next 5 years. The district is moving forward in the area of networking by connecting, as part of CEMS, 2 large minicomputers in order to share student files on the management system using D.N.O.S.

F. RESEARCH METHODS

Dr. Robert Signorile, Professor of Computer Science at the Polytechnic University of New York will be evaluating the project. A partnership is being pursued with this institution in order that a fresh flow of ideas concerning the most recent R & D can be included as part of the on-going system refinement.

The monitoring of the established network will enable the Project Coordinator to see who is using it and for what it is being used. If schools are not connecting to the District Office, personnel can trouble-shoot and find out why. Since this is a cyclical process, diagnosis will be immediate and on-going.

Innovative systems invariably have their faults. People are usually hesitant to try something new. The statement "But we've always done it this way" is all too familiar to administrators and teachers bringing in new approaches, especially technology. What is the answer? There are no clear answers. However, one approach that has worked is a "Rational Comprehensive Approach to Effective Change". This model was used in District 27, N.Y. City (an urban district) successfully by the author of this proposal to develop an actual working telecommunications network.

This approach utilizes a system wide analysis of environmental conditions, before new technology is brought into the organization. The environment in a school is analyzed in a technical (physical conditions) and a non-technical (personnel) way.

"The Rational Comprehensive Approach to Effective Change" will prove to be successful in implementing Project B.E.N.

This model uses a systematic approach to problem-solving. "In the Rational Comprehensive Model, values pertaining to objectives are listed and then ranked according to their importance" (Charles E. Lindbloom*). This model encompasses a critical analysis of areas of concern before a commitment or decision is made.

Utilizing the Rational Comprehensive Model the following factors/steps will be considered before the Baldwin School System implements its Electronic Network.

1. A clearly stated School District Technology Policy.

2. A design of the implementation plan using Project Management/P.E.R.T.

3. Hardware/software decisions and concerns.

4. Environmental Analysis (school-wide, District-wide, technical and non-technical).

5. Staff development/training.

6. System refinement - cyclical/on-going, removing "bugs".

The factors/steps do not necessarily occur in orderly fashion. A number of factors/steps will be put into action simultaneously. This approach is fully documented in the Section C "Program Activities".

*Source:
Modern Public Administration Nigro & Nigro

B. PROGRAM OBJECTIVES

1. IMMEDIATE OBJECTIVES 1986-87

a. School personnel will learn to use a computer with communications software to access information (data) from the district office host computer such as bulletins.

b. School personnel will be able to log-on and learn to send and receive mail electronically using the network.

c. The development of a working, fully functional electronic network connecting nine schools to the District Office used by school personnel daily during school hours.

d. All participants will learn the nuts and bolts of telecommunications in order to apply these skills in a general nature.

2 LONG RANGE OBJECTIVES 1987-88

a. School personnel will become more intimate with the network so that they can down-load and up-load files/and public domain software.

b. School personnel will learn networking as a prerequisite to the implementation of Baldwin School's "Computerized Educational Management System" which uses T.I. minicomputers connected to PCs with terminal emulators. This is part of the district's 5 year plan for technology.

c. Teachers (turnkeys) will apply skills learned to the classroom and the expansion of Project B.E.N. into the classroom at all levels. Initially at the Jr. High School in the "Introduction to Computer Applications" course then on the elementary level. This will be tied to keyboarding skills at the elementary level.

d. The physical expansion of the network to include the District Director of Library/Media and Curriculum Coordinator.

e. To foster greater utilization of the district's B.R.S. service.

C. PROGRAM ACTIVITIES

1. CLEARLY STATED SCHOOL DISTRICT TECHNOLOGY POLICY

Baldwin Schools has designed and is implementing a master plan for the use of technology (computers, etc.) in the schools. This is a commitment the School Board and the School District have made to change.

Before any project of this magnitude can be implemented there must be a clearly stated commitment to implementing change. This occurred and was accomplished by continued discussions with all concerned parties of specific agenda items stressing the uses of technology. Policies are clearly stated, i.e. "Our eventual goal for this school year is to have in place an Electronic Network for all district schools".

Of course, with this commitment comes the necessary, but limited financial resources that will make the initial phase of this project a success. The Baldwin School District will supply the microcomputers for Project B.E.N.

2. DESIGN OF IMPLEMENTATION PLAN USING PROJECT MANAGEMENT/P.E.R.T.

Project Management utilizes techniques for monitoring and keeping track of many tasks as they pertain to a project. There are a number of software packages that produce Gantt or P.E.R.T. charts that can be used with a microcomputer. In this project, the Project Management software that will be used is Microsoft Project on an IBM PC.

The following tasks and/or activities are necessary to implement the first step:

1. Memo/reports to Principals, and pertinent district-wide committees.
2. Identify turnkeys at each school.
3. Hardware/software decision.
4. Environmental Analysis.
5. Training/Staff Development.
6. Initial log-on with District Office.

These tasks or activities will be further divided into subtasks (see item 1).

3. HARDWARE\SOFTWARE DECISIONS

Baldwin Schools is primarily an Apple District. Every school uses Apple II+ or Apple IIe computers. Compatibility is not a major problem. Hayes modems will be used. A modem is the device that connects to a computer and allows it to send and receive data over a telephone line.

Factors that we considered when we selected Hayes as the modem were: baud rate (the bits per second at which your modem sends or receives electronic signals, i.e., 300 baud is equal to 30 characters or letters per second), cost, compatibility with hardware and the available "user friendly" communications software.

Senior High School/Junior High School Configuration

- Apple IIe with one disk drive
- Hayes Micromodem IIe with Smartcom II software
- Imagewriter II Printer
- Dedicated telephone line
- Cooling Fan

Elementary School Configuration

- Apple IIe with one disk drive
- Hayes Micromodem IIe with Smartcom II software
- Imagewriter II Printer
- Dedicated telephone line
- Cooling Fan

District Office Configuration - System

- Apple IIe with Dual disk drives
- Imagewriter II Printer
- Networks II software
- Dedicated telephone line
- Hayes Micromodem IIe
- Corvus Hard disk (20 megabytes)
- Time Clock
- Cooling Fan

4. ENVIRONMENTAL ANALYSIS

Environmental Analysis encompasses both the technical and non-technical milieu.

TECHNICAL - Each school will be visited to determine the location of the modem in the Principal's Office. The telephone wire must be situated in order that the computer be placed in a secure location. A large closet that can be locked after school hours will be most desirable. The modem must be configured to fit the Apple system. This is true for the Hayes micromodem with Smartcom II. In the visit to the Principal's Office the Project Coordinator will take note where the equipment will be placed after 3:00 P.M. In addition, determine if it is used in the Principal's Office in the morning and then placed into a classroom for part of the day. The district's existing phone system is not conducive to data transmission, dedicated lines will be needed. The exact location of the dedicated line in the Principal's Office will be determined at this time.

NON-TECHNICAL - Each District school will have an identifiable turnkey. The turnkey is the "in-house computer literate" teacher. In all the elementary schools the computer expert would be the ML teacher. The ML Program is the elementary school's computer education program. It consists of a Lab of 15 Apples in each elementary school for LOGO, CAI, BASIC and computer awareness instruction. Project Coordinator will determine and analyze the school personnel. Who is responsible, other than the Principal, to make going on-line to the District Office a regular school operation? The school secretary will be the other individual to train in the use of the modem.

Project Coordinator working together with the turnkey will be sensitive and remove all the mysteries surrounding telecommunications. This can be achieved through comprehensive planning, involving all staff at informal and formal discussions at faculty conferences, meetings and other avenues of communication, moving the faculty towards positive computer experiences.

5. STAFF DEVELOPMENT/TRAINING

This is an on-going process. Initially, schools that connect will receive training informally and on a one-to-one basis. There will be one formal workshop in December, 1986.

This will work out well since the school personnel shall receive individualized attention and instruction. The same procedures will be followed, when each school is brought into the network. However, we have added another dimension. One formal inservice concerning telecommunications is planned for the Spring, 1987. The participants will learn how to connect to the District Office Electronic Network and also the "nuts and bolts" aspects of telecommunications. These workshops, of course, will be followed by individual school visits of the Director of Computer Education and Services (Project Coordinator) and computer technician to insure understanding. In addition to these workshops, the District offers inservice computer courses.

Since telecommunications innovations are rapidly changing, new developments will be brought to the attention of all school personnel via a newsletter and other media. The district is also planning to hire, as soon as possible, a computer technician. This person, working with the Director of Computer Education and Services will provide end-user support to all participating personnel.

6. SYSTEM REFINEMENT

In the initial phase of this project, a target day will be set for connecting to the District Office Electronic Mail System. That date is December 1, 1986.

Common concerns will include: software was not configured properly or some contamination on the telephone line (someone else using the telephone line to make a voice call).

Problems can become frustrating; but it is doable. System refinement is not limited to the schools making the connections, but, may be due to the Electronic Network itself.

The Network software "Networks II" must be properly set-up in the hard disk. This will be achieved by using a consultant to properly format and initialize the hard disk. The long range goal will be to connect two other Apples to the network by way of a L.A.N. (Local Area Network) at the District Office. Project B.E.N. can be considered a Wide Area Network or W.A.N.

D. EVALUATION

At the completion of this project, there will be in place a network for electronic mail and bulletins used by selected personnel in each of the district's schools. The person responsible for the completion of the project will be the Project Coordinator, District Director of Computer Education and Services. An independent evaluation will be conducted by Dr. Robert Signorile of the Polytechnic University of New York. In order to monitor the use of the participants, the network software, Networks II logs all messages received and to whom they were sent to along with the date of transmission. The software has two security levels and sensitive data such as student records will not be transmitted. The system operator (Project Coordinator) will log all the messages in order to determine its use each day. The system will be operational every school day from 8:00 A.M. to 5:00 P.M. The message log will be kept and on-going feedback from participants will be elicited vis-a-vis planned meetings of the District Computer Advisory Council.

E. BACKGROUND INFORMATION

The writer of this grant has developed district wide networks such as the Electronic Mail and Bulletin Board System for District 27 in New York City. This is an active working model. He also has extensive experience in LAN's and WAN's. Baldwin Schools has developed a Computerized Educational Management System (CEMS) that will be phased in within the next 5 years. The district is moving forward in the area of networking by connecting, as part of CEMS, 2 large minicomputers in order to share student files on the management system using D.N.O.S.

F. RESEARCH METHODS

Dr. Robert Signorile, Professor of Computer Science at the Polytechnic University of New York will be evaluating the project. A partnership is being pursued with this institution in order that a fresh flow of ideas concerning the most recent R & D can be included as part of the on-going system refinement.

The monitoring of the established network will enable the Project Coordinator to see who is using it and for what it is being used. If schools are not connecting to the District Office, personnel can trouble-shoot and find out why. Since this is a cyclical process, diagnosis will be immediate and on-going.

G. SYSTEM DESCRIPTION

The Baldwin Educational Network - Project B.E.N. is a simple network system utilizing Apple Computers with modems in order to connect to the host computer (an Apple IIe with a hard disk) at the District Office. The system's functions (see item 2) are not difficult to understand when a user logs on. Aside from the electronic mail users will be able to send to one another, the system will support the following applications: on-line computer newsletter, Inservice course bulletins, software reviews, curriculum up-date and Regents Action Plan information. A stand-by power supply will insure a continuity of on-line service and prevent down-time.

The computer configuration in the Principal's Office, when not used for connecting to the network, will be used for office automation applications using Appleworks software or can be placed in the computer lab at certain schools. The nature of the network may seem complex but it is extremely user friendly and enjoyable to use.

USING LOW TECH FOR HIGH TECH RESULTS

Kent Applegate, Bill Morgan , Clancy Wolf, Department of Defense, U.S.A.

If you take the 9th largest school district in the United States and spread it across 15 time zones you have created a school district that stretches over half way around the globe. If you are then given the task of establishing a course to instruct students in 13 schools located at the extremes of this geographical expanse you have a scenario that would give the best of distance educators nightmares. Two instructors in the Department of Defense Dependent School System (DoDDS) however have created a course in advanced computer programming which links American students living in 4 countries into a true "Global Classroom". The entire course is conducted without the benefit of high tech devices such as interactive video/laser disks or real time video transmission. The students, primarily dependents of U.S. military personnel stationed overseas, participate in the course using only a video tape player, a computer, a telephone, and a modem.

The course, Pascal via Telecommunication, is a one semester course designed to teach Pascal to DoDDS high school students regardless of their geographical location. The course was developed by Bill Morgan in 1987 in response to a need for Pascal instruction in DoDDS schools located in Germany. At most schools there either were not enough students to justify a course or there was not an instructor comfortable with teaching Pascal.

Bill Morgan taught the course the first year from Berlin American High School before he was transferred to Okinawa in 1988. After Morgan's departure Kent Applegate took over the course, teaching it from Stuttgart American High School. Morgan has since involved 4 DoDDS-Pacific schools and he and Applegate now teach parallel classes in the program.

The classroom for the course is created by linking a master teacher to students through a computer conference set up on a University of Michigan, Ann Arbor computer. The most recent offering of the course included 50 students from 13 schools located in Okinawa, Italy, Korea, and Germany. As more DoDDS regions become active in telecomputing it is hoped that other countries will participate. Interest in participation has been expressed by educators in

England, Iceland, Bermuda, the Philippines, and Japan.

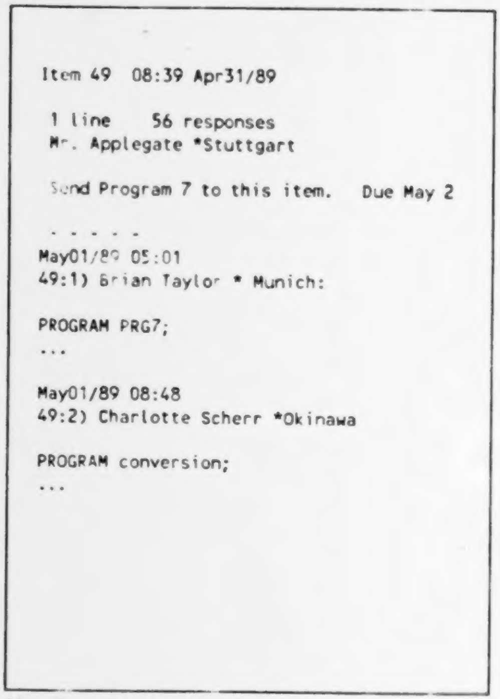
Course Components

The course begins with training in telecommunications and the use of the CONFER II communication program used on the University of Michigan computer. CONFER II is a powerful electronic mail/conferencing program used by the University of Michigan. Instruction in the Pascal programming language follows using video taped lessons, interactive tutorials on disk and student assignments. The course is designed so that minimal teacher supervision is required at participating schools.

Telecommunications

In the first two weeks of the course students learn how to use the two main features of Confer II which are used extensively in the Pascal via Telecommunications course: responding to "items" and messaging.

The use of "items" by students and the teacher is what separates Pascal via Telecommunications from traditional correspondence courses. An "item" is a running dialogue where a statement is made by one person and the responses from others follow. The original statement and all of the responses may be seen by the students at any time. The students are notified of any new discussion each time they sign on. The ability to discuss a particular statement or topic provides the classroom atmosphere of the course. The discussion is not carried out in "real time" as in a traditional classroom but over a period of 1 - 5 days.



```
Item 49   08:39 Apr31/89

 1 line    56 responses
 Mr. Applegate *Stuttgart

 Send Program 7 to this item.   Due May 2

 . . . . .
May01/89 05:01
49:1) Brian Taylor * Munich:

PROGRAM PRG7;
...

May01/89 08:48
49:2) Charlotte Scherr *Okinawa

PROGRAM conversion;
...
```

Fig. 1   Sample Item

Generally a discussion topic is initiated by the teacher by creating an "item" and the public discussion by the students and teacher follows. "Items" are also used to make announcements to the class by the teacher or students. Figure 1 shows the layout of an item. The item and each response are time stamped simplifying record keeping.

A measure of privacy is important in any classroom setting. Often the teacher needs to speak privately with a student or vice versa. This

is accomplished via private messaging. Messages are used by the teacher to provide students with feedback encouragement and motivation. Students use messages to ask questions of the teacher or to "talk" with fellow classmates. Student assignments also remain confidential through the use of private items.

Videos

To give students the benefit of instruction from a real teacher, the majority of instruction for the course is done through video tapes. The video tapes are made during actual classroom sessions that follow the Pascal via Telecommunication course outline. This helps to bring out difficulties that students will run into and gives an atmosphere of reality to the videos. Difficult concepts and trouble spots are discussed in the videos to clarify things not covered in the text or ideas that students often have trouble with.

The video tapes are the most valuable asset students have in the course. They are able to view and review the tapes if they continue to have difficulty with the material. The videos are taped and edited using the video equipment of the schools and military TV facilities. Although they are not of professional quality, the videos relate the information necessary for students to succeed in the course.

Tutorials

Additional instruction for each chapter is done with interactive tutorial disks. The tutorials are designed to repeat instruction covered in the video tapes and present the information from a different perspective than that of the video. The disks are interactive and test students on material covered. Since students are supposed to view a video tape before doing a tutorial, major points from the video are also tested. A performance evaluation is printed at the end of the session and given to the local teacher. This information is transmitted to the master teacher for recording.

Assignments

Reinforcement and practice of concepts is done through programming and worksheet assignments which are transmitted to designated items in the conference.

The programming assignments are designed to emphasize proper planning and development of programs. Programming style is stressed so students not only develop effective structured programming techniques but so they also overcome the "spaghetti programming" tendencies that may have been picked up from other programming languages.

Worksheets are short sets of questions from each chapter that test the student's understanding of concepts learned in the newly introduced programming techniques.

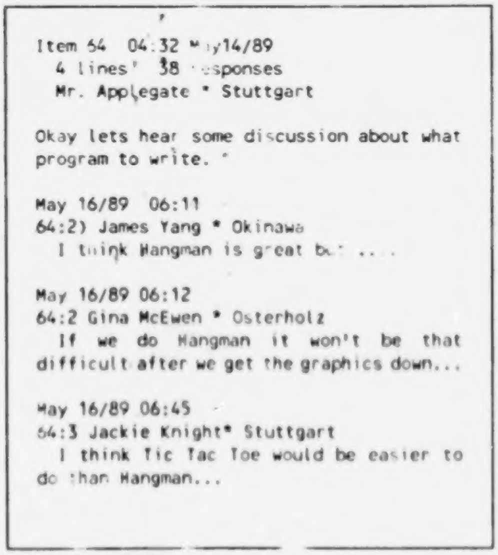
After every second chapter, a test is given. In later chapters the tests include program problems that test the student's ability to correctly utilize programming commands, techniques, and strategies. Student answers are transmitted to items just as programs and worksheets are sent in. All assignments are retrieved by the master teacher and graded. Grades and instructive feedback are sent back to students.

Group Projects

One of the most exciting parts of the course is a two week group project conducted at the end of each quarter. The project gives students the opportunity to show the teacher and fellow students what they have learned about Pascal and telecommunications. This not only increases student to student communication but demonstrates the modularity of Pascal in a real life sense.

The project begins with 2 or 3 days of total classroom discussion to determine what program the class will do. A game such as Hangman or Trivia is typical. The discussion and ultimate vote is conducted through an "item" similar to that shown in Figure 2.

The students develop an algorithm for the program over the next 2 days and determine which Pascal procedures will be needed. Students volunteer for or are assigned to work together in a group with 4 or 5 other "classmates" to develop one of the program procedures. No two students in a group are from the same school so all communication among group members is done electronically. The groups discuss, write, and rewrite their procedures over the next 4 to 5 days and a final group procedure is sent to the teacher.



```
Item 64  04:32 May14/89
  4 lines  38 responses
  Mr. Applegate * Stuttgart

Okay lets hear some discussion about what
program to write.

May 16/89  06:11
64:2) James Yang * Okinawa
  I think Hangman is great but ....

May 16/89 06:12
64:2 Gina McEwen * Osterholz
  If we do Hangman it won't be that
difficult after we get the graphics down...

May 16/89 06:45
64:3 Jackie Knight* Stuttgart
  I think Tic Tac Toe would be easier to
do than Hangman...
```

Fig. 2 Sample Project Item

The teacher along with a few advanced students put all of the procedures together and make changes where appropriate. The final version is uploaded and each participating school can download and use the project.

PvT vs Traditional Distance Learning

Pascal via Telecommunication has taken all of the benefits of a correspondence course (self paced, minimal direct supervision, low cost) and added quick, easy communication between teacher and student.

Although Pascal via Telecommunication does not include the direct verbal interaction of teacher and student, several advantages arise from the course design.

Interaction is present both between student and teacher and between students in the form of messages. This written communication requires students to write clearly and effectively to get their intended messages across. Some students establish lengthy dialogues with other students about interests, hobbies, and future plans. This is not discouraged as it establishes some of the camaraderie that exists in a traditional classroom.

The cost of the program is inexpensive when compared to programs that utilize video transmission from a central location to dispersed classrooms. In Pascal via Telecommunication the majority of instruction is done offline through the videos and tutorials so instruction costs are kept to a minimum. The direct expense of Pascal via Telecommunication is in online connection costs. With a direct video connection, there is expense involved with the transmission of the signal, support personnel for the broadcast, and direct supervision required at the individual schools.

The networking design of the course (each class establishing independent communication connections) gives individual schools maximum flexibility for scheduling. Since it is not necessary for students to be online at the same time, students can be scheduled during any period of the day at each school. The 3 or 4 students from any one school need not be scheduled during the same period either. Each one can participate at a different time of the day. The time zone independence of the course makes it possible for the four countries to participate without consideration of time and will allow other countries to join the course.

The course design provides resiliency to the program when communications fail. If any school or region loses its communication ability, students can continue to follow the assignment schedule until communications are restored and then upload their completed work. Although there is a delay in feedback during this time, there is no additional cost involved during the technical difficulties and the course of study continues essentially uninterrupted. Technical difficulties in a direct video connection course would be devastating to the pace of the course.

Students who wish to work ahead of the schedule are not slowed by the pace of the course. Since all lectures are on videotape, faster students are encouraged to move ahead of the rest of the class as long as they continue to participate in the discussion.

Hurdles

There are several technical and logistical hurdles that must be overcome to implement a program such as Pascal via Telecommunication.

The first hurdle is getting communication capabilities established at individual schools. Some of the DoDDS schools experienced difficulties getting a telephone installed. Many of the teachers involved either utilize a computer located close to an existing telephone or run an extension line for the modem to transmit and receive information.

As new schools are added each semester the problem of training the local teacher comes into play. Although the training required is minimal, the teachers are spread over a large geographical area and there is no easy way to bring them all together for training. It has been in large part through the perseverance of the individual teachers that a base of expertise has developed. Once a teacher is able to get online, support is available through others on the system.

The biggest deciding factor for success of a student in the course has not been the ability of the student (a "C" student can do fine) but whether the student can work independently or not. At most schools there are 2 to 4 Pascal via Telecommunication students in a class with students taking another course. The Pascal students must work alone and although the work is not difficult, if a student is unable to keep up with the schedule with minimal supervision, he/she will have difficulty passing the course. Some very capable students have received poor grades in the course because of this.

Since the University of Michigan computer is being accessed through three different data networks from around the world there are bound to be problems with communications from time to time. Although this disrupts the course to a certain extent, as noted above, students at the affected schools can continue with the lessons and upload work when communications are restored.

The Future

Although the materials for the course are updated and improved every semester, several major improvements loom on the horizon for Pascal via Telecommunication.

Beginning in the Fall of 1989, a Mentor Program is being established with the University of Michigan. This program will use University of Michigan computer science students to provide close supervision, personal communication, and feedback to small groups of PvT students. Groups of 4-5 students will be assigned a mentor. Mentors will also provide a weekly summary of student progress to the master teacher. This will not only ease the work load of the master teacher but also provide students with a full time resource to provide additional assistance where necessary.

DoDDS is currently

promoting advanced placement studies in all curricular areas where testing is available. A year long Pascal course taught using the format of Pascal via Telecommunication will start in the Spring of 1990. This course has been under development for a year by Morgan and Applegate and is designed to prepare students for the Advanced Placement Computer Science "A" test. The Pascal via Telecommunication format is being considered as a model for calculus and other DoDDS advanced placement course offerings.

As the course is improved and updated, better video and tutorial authoring techniques are being pursued. Assistance with video production is being sought from military and commercial sources. Additional video production and editing equipment is being purchased. A state of the art authoring system is being purchased to help improve the presentation and instructional soundness of tutorial diskettes. It is hoped that in the next few years interactive video or interactive laser disk technology can be used to integrate the video and tutorial portions of Pascal via Telecommunication to further improve quality.

Expansion of the Pascal via Telecommunication classroom beyond the bounds of DoDDS is being considered. There has been some interest in the Pascal via Telecommunication program shown by rural Michigan schools. If technical and financial considerations can be ironed out, these schools may also join the course in the near future.

EUROPEAN PROGRAMME FOR ADVANCED CONTINUING EDUCATION EURO-PACE

Jacques Bieber, IBM, Belgium

1. Introduction

Euro-PACE : European Programme for Advanced Continuing Education-is an initiative of a number of European -based telecommunication and computer companies. It is aimed at meeting the needs of these companies, and of others wishing to join the Programme, for the education and up-dating of their staff at the leading edges of technological advances. It is also aimed at knowledge-transfer between the companies and a set of academic "centres of excellence" in Europe.

The companies sponsoring the establishment of the service include, at the time of writing, British Telecom(UK), Bull(France), DEUS consortium (Denmark), Digital Equipment Corporation Europe, FUNDESCO(Spain), FUNDETEC(Portugal), Hewlett-Packard Europe, IBM Europe, IRI(Italy), NORIT consortium(Norway, Sweden and Finland), Philips(Netherlands) and Thomson(France). The Commission of the European Communities is also supporting Euro-PACE through its COMETT programme.

One of the first steps towards the creation of Euro-PACE was taken at an international Forum, held at Jouy en Josas, France in June 1987. The preparatory phase of design and organization has taken place between July 1987 and February 1988. A limited pilot phase has been operated between March 1988 and August 1988, and has been followed by a full year's pilot phase (October 1988 to July 1989). Each of these stages of operation was envisaged to represent a step in the development of the service in educational, technical and marketing terms, leading to the introduction of the full service in October 1989.

This presentation is being prepared in November 1988, with the full pilot phase in its second month and with some 30 sponsor sites receiving 5 courses, on the following topics :

- Telecommunications
- Software engineering
- Artificial Intelligence
- Advanced manufacturing techniques
- Microelectronics

Ten universities,spread across Europe, have been chosen as observers. Six of them are already tuned in to the satellite reception.

This presentation concerns itself mainly with the technical aspects of the project, but it will also attempt to address the preliminary reactions that Euro-PACE is gathering on the educational front.

Initial ideas on the educational, organizational, financial and marketing aspects of the programme have been outlined in documents presented at the Euro-PACE international Forum.

2. General concept

The general concept the Euro-PACE educational service is shown in the attached figure. It shows the flow of video, audio and computer-generated information between university and company sites distributed throughout Europe. The video and audio signals may originate in analogue or digital form, although, initially, analogue mode of working will predominate.

To support this multipoint-to-multipoint network, a telecommunication infra-structure has been established.

The production facilities supply the major proportion of the educational materials transmitted in the Euro-PACE network. Their output is primarily recorded or live video, but also includes text material accompanying the video productions, as well as computer-based support services. We shall return to the subject of production facilities in greater detail in Section 3 below.

Satellite transmission will be used for broadcasting of educational video materials over Western Europe. The details of the service will be outlined further in Section 4.

The learning environment includes facilities for the reception, viewing and recording of broadcast video, the replay of recorded video. Interaction between locations is catered for by personal computers or computer terminals, telephone and facsimile equipment linked to the public terrestrial telecommunication networks.

The main role of these terrestrial networks in the Euro-PACE project is to provide a fast link between the originating point of a course and the distributed receiving sites. This enables participants at the sites to put questions to a presenter and obtain a rapid response. It also makes it possible for a participant to enter into 'conference'-type discussion with other participants.
Euro-PACE also believes that the interaction over computer networks will reduce the language and cultural barriers that are more difficult to overcome in oral communications.

For the initial phases of Euro-PACE it is envisaged that the majority of the courses will be recorded, and then transmitted within a few days of their recording. They may well be recorded again at the reception sites to allow learners to benefit from them at the most convenient times. Local tutors will provide a company-based support and 'remote' tutors at academic sites will be available, over a period of time, to deal with questions which relate to the courses originating from there.

Live transmissions are intended for conference-type "special events" in topic areas where, for example, progress has been so rapid and recent that structured learning materials are not yet available. In such cases, the aim is to allow remotely located participants to contribute to the televised proceedings as if they were present at the event. Initially, such contributions will be made via a voice channel or by text messages on a computer network.

3. Video production and Euro-PACE classrooms

It has been recommended that the production of video material for Euro-PACE take place in lecture rooms with studio facilities, to a professional, though not necessarily broadcast standard. For the pilot phase, this means the use of high-band U-matic 3/4 inch recording equipment, electronic mixing and editing. Video taped material will contain two sound tracks : one for the original language of presentation, the other for a second language (voice-over in English ?).

For live events, the lecture rooms will be equipped with telecommunications, as well as video facilities (e.g. telephone, fax, modem, computer terminals with interfaced projectors) to aid with presentation and to support real-time interaction with a set of remote sites.

The learning environment will also have video recording / replay and telecommunication facilities. This time, however, the recording and monitoring equipment is envisaged to be of high-quality consumer, rather than professional standard, with two audio tracks and programmable controls. This latter requirement is important to enable unsupervised recordings to be made of broadcasts at any hour of the day or night. The telecommunication equipment will include a satellite receiver, telephone, data terminal and possibly fax or other graphic communication aids.

4. The space segment

In the initial phases of Euro-PACE, satellite broadcasting will form the main method of transferring live and recorded video material and its associated audio. From the production studios, live video will be transferred to the PTT operated uplink sites by ground link. It is envisaged that eventually up linking will occur from each country where Euro-PACE has production sources.

For recorded video material, Euro-PACE will provide a central point of coordination which will handle tape replay and programme scheduling.

Uplinking is provided by PTT's. After an initial stage, where taped material was broadcast during the night, Euro-PACE now broadcasts its courses during business hours and within a couple of months Euro-PACE will be ready to run the taped material on its premises and microwave it to the PTT (private uplinks are not allowed in Europe).

In some countries reception is still done by PTT installed reception equipment, as at the start of its operations Euro-PACE is classified as a private business service, rather than a public broadcasting service.

5. Terrestrial networks

As mentioned earlier, Euro-PACE envisages the use of a variety of public telecommunication services for interlinking participants. Links are required during live events for relaying questions and answers which in some cases may not be confined to voice but include text and graphic messages. This type of facility is catered for by telephone, V24 and X25 connections carrying voice, fax and data, on a dial-up basis.

Links are also required in support of the study of recorded materials, that is asynchronously with the broadcast of these materials. In this mode, instantaneous responses are not necessarily expected, although for effective learning any significant time delays in communication should be avoided. Among the initial methods to be tried in this context will be telephone and electronic mail / computer conferencing.

Euro-PACE makes use of an existing computer conferencing facility to provide a service to its participants. The service can cater for up to 32 simultaneous users, via packet-switched data networks. This facility is also used to provide and alternative to voice links during live events (language barrier).

6. Discussion

One of the main purposes of the pilot phase of Euro-PACE is to explore and assess various alternatives for implementing the overall objectives of the Programme. Evaluations will be carried out of the educational, organisational, financial, and of course of the technical performance of the system.

On the technical side, each of the areas of production, transmission, reception and feedback has specific points of interest, as a satellite- based Europe- wide educational network has not been implemented before. However, as the start-up system is based on relatively well established subsystems, the primary interest of the evaluators concentrate on the least proven components :

- international cooperation in multi country satellite uplinking,
- the performance and cost of use of international data links and in particular, X25 services,
- methods for providing interaction between various sites and using various media over telecommunication networks, particularly in real time,
- inter-operability of equipment installed in various countries,
- methods of dealing with the language problem, etc..
- encryption

In each of these cases, several alternatives will be explored. There are, however, areas of operation of Euro-PACE where the technical solutions provide the basis of the system's overall 'philosophy' and can be taken as relatively stable. These include :

- the predominant use of video as the medium of knowledge transfer,
- the use of satellite transmission for that purpose,
- the use of a variety of networks in support of satellite-based distribution.

An important reason for these start-up assumptions is the success of a similar initiative in the United States ; the National Technological University (NTU). NTU started satellite broadcasts of advanced technical education in August 1985. In 1986, it transmitted broadcasts originating from over 30 universities. These were received by companies in over 50 locations. The system is expanding rapidly, and by late 1988 it expects to use 4 channels full time. Similarly to Euro-PACE, it also uses a variety of telecommunication media in support of its satellite-based video education programme.

There are, however, crucial differences in the environment in which Euro-PACE and the NTU operate, and these differences have significant implications for the technical, educational and economic basis of the two systems. Among these perhaps the most evident is the regulatory framework for telecommunications in the U.S. and in Europe. Whereas in the United States, for example, the universities participating in NTU own and operate their own uplinks, in Europe uplinking is restricted to a very few operators. In the U.S., companies associated with NTU, and others, can buy and install their own TVRO or indeed two-way equipment.

Another basic difference between the environments of Euro-PACE and the NTU is the multinational and multilingual nature of Europe. Only time will tell whether the assumptions built into both systems lead to similar solutions on the two sides of the Atlantic. Technological progress will ensure that the technological development of the two can be expected to be on similar lines.

What further developments of Euro-PACE can we anticipate on the technical side ?

In the short term Euro-PACE is evaluating the different technical solutions available for encryption and transmission of a second sound channel, and is, therefore, watching with great interest the development of the MAC standard in Europe. Progress in digital video codecs is also of interest to Euro-PACE, both of these developments allowing a potentially more cost effective utilisation of satellite channels and associated equipment.

These decisions, however, are more than just technical ones and have far reaching implications that must be very carefully weighted.

In the medium term, the advent of the new generation of high power ("direct broadcast") and the availability of two way VSAT links to them will enable Euro-PACE to approach the more flexible mode of operation of its counterpart in the United States. The gradual introduction of ISDN into the communication networks of Europe can be expected to provide a simpler more convenient method of interactive digital communication for Euro-PACE participants, replacing the current range of incompatible access technologies.

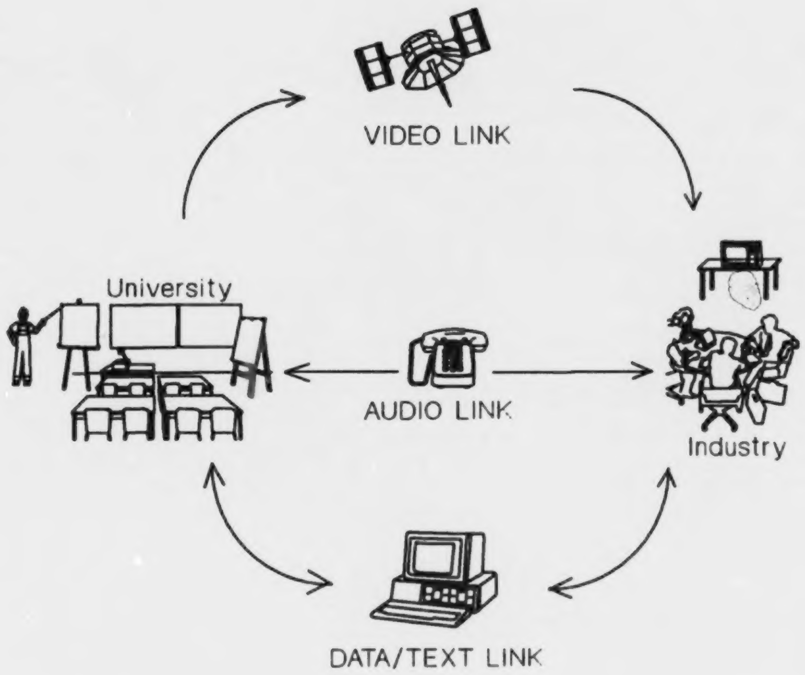
7. *Initial reactions*

As mentioned before, some 30 sites in the United Kingdom, Germany, Belgium, The Netherlands, Portugal, Sweden, Spain, Finland, Switzerland, Italy, France and Denmark are already receiving the Euro-PACE courses as this presentation is being prepared. Some 200 students are enrolled in the courses.

In most cases the quality of the satellite transmission as well as of the computer conferencing network is considered better than adequate.

Therefore, quite logically, the very first reactions stress the need to concentrate on the level of the courses (how advanced is advanced ?), the quality of the pedagogy, the need to broaden the awareness (more students and more course providers), the financial structure (charge per student ? per site ? per company ? etc...) and last but not least language. Plans exist for all these reactions to be integrated into an ongoing evaluation process. The author intends to address them in his presentation in August 1989.

PACE CONCEPT



REFERENCES

1. "PACE General Report", June 1987. Available on request from Euro-PACE : 7, Place de La Défénse, 92090 Paris La Défénse CEDEX 26, France

2. "The NTU/AMCEE Instructional Satellite Network", by Lionel V. Baldwin, April 1986. Work in America Institute, Scarsdale, N.Y. - U.S.A.

3. "PACE : A Satellite and Terrestrial Network-based International Education Service", Eurotelecom Madrid 88, by Peter Zorkoczy, Open University, Milton Keynes, UK.

Jacques BIEBER
is ICME AIBr 1962. He is presently Manager, Education Technologies Programs, IBM Europe, in La Hulpe. Within the Euro-PACE project he is secretary of the Restricted Technical Action Group (RTAG).

DEPARTMENT OF DEFENSE DEPENDENTS SCHOOLS ON-LINE SIMULATIONS AND COURSES WITH THE UNIVERSITY OF MICHIGAN (DISTANCE LEARNING) - SETTING THE STAGE

Sam Calvin, Department of Defense Dependent Schools, U.S.A.

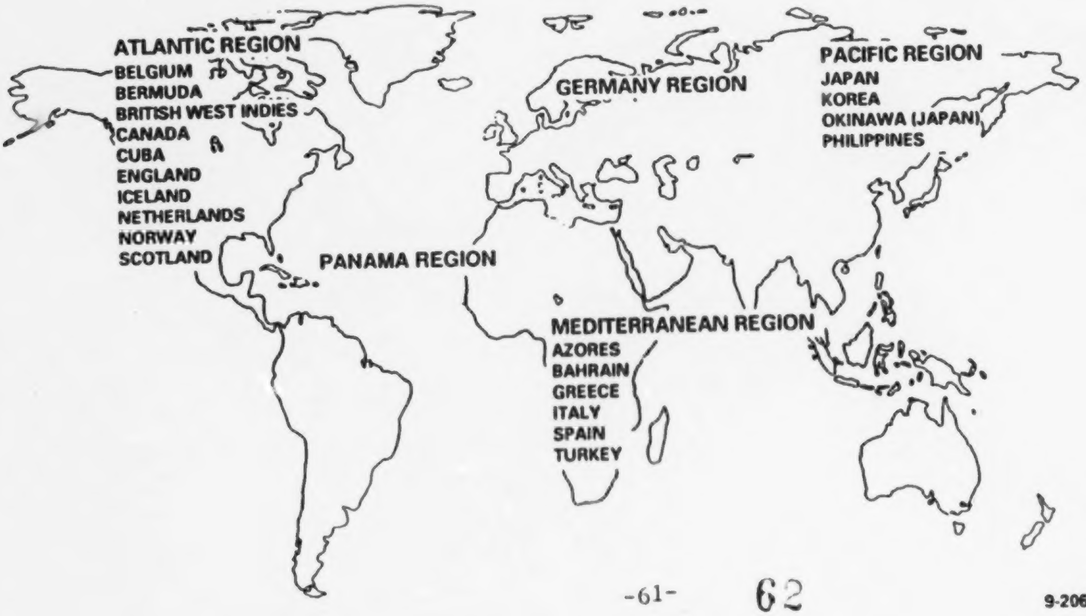
Abstract:

The United States Department of Defense Dependents Schools (DoDDS) in cooperation with the University of Michigan has sponsored worldwide "on-line" courses (distance learning) and now has a perspective for a global electronic communications system. Schools have participated in the following Interactive Communications Simulations exercises: Arab-Israeli Conflict, United States Constitution, Thinkers League, and Water Monitoring Program. In a similar format, Pascal computer language courses have been developed and are being taught by DoDDS teachers.

Local Area and Wide Area Nets are being implemented to evolve into a global DoDDS-Net.

Classroom teachers provide the impetus to these developments.

DODDS REGIONS


ATLANTIC REGION
BELGIUM
BERMUDA
BRITISH WEST INDIES
CANADA
CUBA
ENGLAND
ICELAND
NETHERLANDS
NORWAY
SCOTLAND
GERMANY REGION
PACIFIC REGION
JAPAN
KOREA
OKINAWA (JAPAN)
PHILIPPINES
PANAMA REGION
MEDITERRANEAN REGION
AZORES
BAHRAIN
GREECE
ITALY
SPAIN
TURKEY

Outline

A Who am I?

I am a teacher, coordinator, manager, sometimes director, of the evolving uses of computer technology in DoDDS schools. I have been at this task for the past 20 years, trying to keep abreast of the bubbling technological developments coming at us as an endless conveyor belt of finished products. Each tool must be assessed for its value in our curriculum. If and when we can afford it, how, what, and where are we going to use a specific technology? I am located in the Germany regional office.

B Organizational Structure - What is DoDDS?

Locations grades and sizes CHART, MAP

Management Initiatives

School Improvement Plan, Skillful Teacher staff development, Site Based Management, Curriculum Alignment

Curriculum Structure

Language, Mathematics, Reading, Social Studies, Science, Aesthetics (Art, Music, Humanities, Drama, Dance), Physical Education, Career Education, Computer Science TAG, Special Education

Seven Year Program Review Cycle, U.S.A. Congressional Mandate (goals for standardization, uniformity, U.S.A. comparability)

C Educational Computing Instructional Goals: HAND-OUT

Integration and Mirroring our social and industrial cultures:

The bottom line is that it's really hard to integrate technology with the curriculum, but in recent years we've made great progress.

Computer Literacy/Science -Productivity Tools-

Word Processing, Spread Sheet, Data Bases, Graphics, Telecom, Local Area Net
* Programing

Problem Solving
* using telecom

D Ongoing Major Integrated Computer Curriculum Initiatives:

Business Education

* Science - using old Atari 800s for real time monitoring

* Talented and Gifted, Advanced Placement

Music, MIDI with Mac's

Computer Based Instruction Demonstrations, Kn-12, all disciplines
Integrated Learning Systems vs Stand alone packages
Jostens Learning Corp. (Kn-8 Language & Math)

Graphic Arts - DTP with Mac's

Drafting, CAD

* Social Studies - University of Michigan ICS

Language Arts - word processing a grass roots development

Foreign Languages

Media Center (Library) telecom planned

Guidance Support Services

E Technical Perspectives, historical and new developments

CPUs, projecting *connectivity* as the fourth wave:

1st wave	1950-	mainframes	shared via card input
2nd	1970-	minicomputers	time shared
3rd	1980-	PC's	stand alone
4th	1990-	connectivity	sharing resources

RAM for users:

Shared, 4k, 8k, 16k, 32k, 64k, 640k, 1-16meg.

Data Storage:

Paper tape, 80 Column Cards, Floppy Disks, Hard Disks 30meg, CD-ROM's, and very large READ/WRITE high speed mass storage units, Laser/Magnetic CDs, 600-1000+meg bytes

External Data Transfer Rates:

Teletype 10 cps or	100 Baud	cps = character per second
Acoustic coupler MODEM	300 Baud	
Direct connect MODEM	2400 Baud	Baud = bits per second
	9600 Baud	or 9600 bps
ISDN 64k bps	64,000 Baud	(voice, data, video)
LAN Ethernet	2,000,000 Baud or 2-10meg bps	
Optical fiber	100meg bps	

Modes of presenting information:

ANSI text, Graphics, Voice, Video
on the horizon Desk Top Video or Random Access Video.

Techniques of sharing information:

E-Mail (text, graphics, files) Fax, Voice Mail, ISDN, X.400

Telecom requires:

Computer or PC, Phone, MODEM, Software
Central Repository -BBS, Confer II, Host, cc:Mail PostOffice
Standards - ASCII, V.22bis 2400 Baud, X.25, X.400

F Curriculum Subjects/Topics using Telecom Technology:

University of Michigan Interactive Computer Simulations exercises:

Arab-Israeli Conflict, United States Constitution, Thinkers League, and Water Monitoring

Pascal Programming - developed by DoDDS teachers

Technical Education Research Center TERC:

Star Schools Project - Telecom, Design (problem solving strategies), Radon measurement, Weather, Patterns from Iteration, and under development Trees, and Tides

G Adult Educators using Telecom Technology:

Computer Coordinators and Contact Teachers Computer Conference
School Administrators via District Computer Conferences

H Future Connectivity Plans, DoDDS-Net:

Purpose:

To move digitized data (E-Mail, bulletins, Fax, files, graphics, voice mail) from any work station to any other work station or group of work stations connected to or accessing the Net.

Goals:

Most all work stations supported, easy to use, secure, efficient and economical, facilitates cooperative work groups.

Implementing Actions: * LAN, WAN, Global-WAN * 2 CHARTS

Local Area Nets (LAN), Novell Netware software is being implemented in classrooms, school, district, regional and headquarters offices in Alexandria, Viriginia.

Wide Area Net (WAN) is the linking of LANs via MODEMS and the local (ETS or commercial) phone system.

Global-WAN, six Unix AT&T 3B2 host computers connected via DDN (X.25 communications cloud) are being installed in regional offices to provide global connection.

Projected User Environment:

A user upon logging-in or while logged-on to a work station will be alerted to new information the system has received, all transparent to the user. The user has the options to read, respond, modify, forward, store, delete, or create as desired.

I Structuring to utilize the Media:

The problem at hand is, how can we best organize ourselves to use our current technology for today and tomorrow? What can we "do" now that we could not "do" before? How do time of delivery/response, access to large information storage/retrieval, very large data bases, and powerful processing capabilities make a difference? What new ways should we be working together to educate our youth for living in tomorrow's global village? Our youth should be exposed to conceptual opportunities that will nurture new hopes and new dreams.

J Staff Training: Last because of its importance!

For 20 years DoDDS has been conducting 1-5 day and 1-2 week, workshops on using computers in the classroom. This training effort has led to the develoment of a thriving subculture of computer enthusiasts within the schools who share software concepts and information. Our model is to build an internal knowledgable staff and organize groups to facilitate peer teaching. Boston University is helpful in propagating this model and graduate credit is granted in recognition of these endeavors. During the past few years with the addition of school computer coordinators, one per 14-25 schools, and procurement of microcomputers (Atari 800, MS-DOS, Apple IIgs, Mac), 1 per 30 students, our over all involvement has dramatically expanded.

Our classroom teachers have provided the impetus and leadership in the development and implementation of our curriculum programs, school administrative systems and regional management information systems. This synergy includes our students as well.

Your comments are welcome.

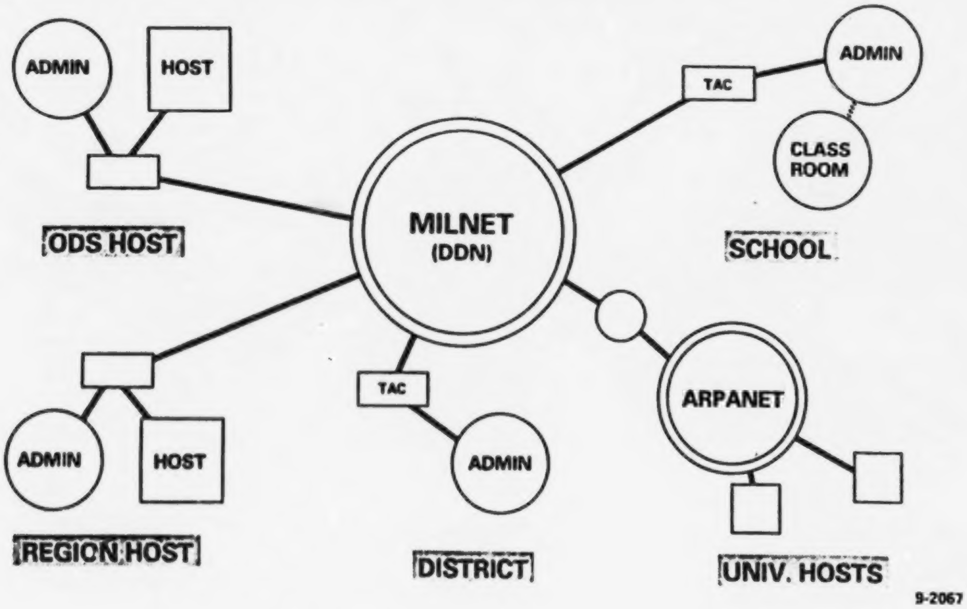
DODDS "...BUILDING TOMORROW TODAY"

STRUCTURING TO UTILIZE THE MEDIA

How can we best organize ourselves to use current technology for today and tomorrow?

What new ways should we be working together to educate our youth for living in tomorrow's global village?

DODDS-NET


ADMIN
HOST
ODS HOST
TAC
ADMIN
CLASS ROOM
SCHOOL
MILNET (DDN)
ADMIN
HOST
REGION HOST
TAC
ADMIN
DISTRICT
ARPANET
UNIV. HOSTS
9-2067

THE EDUCATIONAL TELEMATIC NETWORK OF CATALONIA (XTEC): FUNCTIONAL CHARACTERISTICS AND STRUCTURE

Jordi Castells, Guillem Carreras, Generalitat of Catalunya, SPAIN

1.- Introduction.

The Educational Telematic Network of Catalonia (XTEC : Xarxa Telemàtica Educativa de Catalunya) is an institutional project promoted by the Educational Computing Program (PIE : Programa d'Informàtica Educativa) of the Department of Education of the Generalitat of Catalonia (The Autonomous Government which now has jurisdiction over education). At the start more than 400 teaching institutions, mainly state secondary education teaching institutions, are taking part in the project, but in the future almost all the 6.000 teaching institutions of all kinds existing in Catalonia will gradually join in.

2.- Presentation: The XTEC as a support tool for a "virtual village".

Similarly, as with computing, the introduction to the use of telematics in the educational system offers a variety of possibilities, given that we're dealing with a powerful and versatile technology.

In this sense, as I'm presenting the XTEC project, I propose to consider it as an instrument that helps the educational system to view itself as a "virtual village" (a term which I propose as an adaptation of "global village", the slogan of the symposium). A virtual village is a collective that is not geographically situated within the boundaries of a concrete space, but one that is integrated by all those who share common goals and daily tasks. In this field, telematics helps to reduce distances and easily conceptualises the community dimension of an environment, which in the case of the XTEC is the Catalan educational system.

The XTEC users may consider themselves inhabitants of this virtual village where they undertake various activities. In order for these activities to take place, there must be, indeed, computer programs that can provide support for them, but the concept of the service must be wide so that we can all benefit from the advantatges offered by this technology.

Next we are going to present the services - functional characteristics - initially available in the XTEC. With the user's ideas and suggestions new services will be developed in the network and this will allow the number of possible activites carried out under telematic support in this virtual village to increase in number and variety.

3. Functional characteristics of the XTEC.

The available services at this moment (January 1.989) are the following: Electronic Mail, Questions and Answers, News Bulletins, File Transmission, Teledebate and Access to Databases. These services -which are described in the following paragraphs- do not constitute the limits of the XTEC possibilities, but just the beginning.

Electronic mail is equivalent to the postal service of the virtual village. As such, it guarantees confidentiality of access to the information thanks to the use of passwords which are equivalent to the keys that open the real post office boxes. The sending of telematic messages presents the advantatges of the virtual instantaneity in the sending of messages and the possibility of sending the same message to several receivers through clustering mechanisms. In the XTEC, the sending of messages seeks to constitute a vehicle of communication among the members of the educational system, especially among those who share common goals (work groups, interest circles,... etc.). To have access to the sending of messages, it's necessary to have a personalized code that can guarantee privacy of access to the messages.

Questions and Answers is a service that is situated in the terrain of common use in the virtual village. It can be considered as the simulation of a notice board on which the inhabitants of the village place their requirements ("Questions") or proposals for solution ("Answers") to the same. Both the questions and the answers are for public consultation, since it has been considered that access to them may be of a wider interest than the strictly individual.

The Electronic News Bulletins is an informative ("newspaper" or "magazine") of the virtual village. Any group of inhabitants may become suppliers of information of communitary interest, in an structured way. Inicially the XTEC offers a news bulletin about the activities of the Educational Computing Program, but very soon new information services will be added to the XTEC, such as a general news bulletin about educational information and others. In the XTEC the electronic news bulletin can be read by entering the different sections through menus or keywords. There's also the possibility of telematically loading the pages one is interested in into a local microcomputer in order to later facilitate their calm reading without excessive telephonic costs.

The File Transmission can be seen as a depot or store where one can leave the packets ("files") for other inhabitants, these being concrete individuals, groups or the public in general. The proliferation of the use of microcomputers in education - the PIE has distributed 3.500 of them in the last 3 years to the Catalan public secondary schools - means that nowadays plenty of valuable materials - notes, databases, programmes, electronic sheets, drawings,... - are available on magnetic media, constituing files. By means of this service these materials may acquire a more communitary dimension since they can be easily distributed and shared.

The Teledebate is also part of a common terrain of the virtual village. In this case a hypothetical "agora" in which a debate or discussion takes place. All the contributions are recorded and made available in an organized way for access or future reference. It is also possible to obtain a written version that constitutes the "proceedings" or results of the debate. This tool is offered to the service of the educational system in an illusioned and novel way and only expirience will show its advantatges and limitations.

Access to the Databases may be compared to the present services of communitary information of the villages and communities (libraries, archives, registers, ... etc.). By means of this service the inhabitants of the virtual village may have access to information that in many cases will help them perform their tasks in the village more easily and with greater scope. Under this philosophy, the PIE has designed, and promoted the collective building and use of the Database of educational resources SINERA (System of Educational Information of Resources for Learning) that will povide teachers with information about available resources (books, videos, ... etc.) to help in attaining concrete goals (for instance, to promote the knowledge of the physical Geography of La Garrotxa).

As it has been previously said, the sevices described constitute only a sample of the possibilities that a telematic network offers when it is made available to the educational system. In fact the emphasis has been put on being able to have initially some underlying basic services available that may assist the daily general functioning of the village. In this field new possibilities will have to be added and the present ones improved. We can mention as examples the help in registering for activities that take place in the village (courses ... etc.), or the carrying out of surveys that help to find out the opinion of the inhabitants about different aspects of the village itself. But the XTEC can be more than this, it can provide the territory of support for the common activities in which the inhabitants of the village participate: Team projects, games, lectures and telematic tutorship, constitute some examples of the new services that might develop. To imagine a new sevice it is only necessary to think of a possible, reasonable activity or situation in the globality of the educational system and that takes place through the telematic medium. The keys to this reasonability hang on its cost, both absolute, and comparative with respect to other possibilities of media, and in its pedagogical appropriateness, given that this is the "raison d'être" of the educational system.

4. Structure of the XTEC.

The XTEC is made up of a central computer, called the server, some terminal computers and a transport network.

The central computer, server of the XTEC netwok, is located at the headquarters of the PIE and is a DPS8/49 model, of Honeywell BULL, with a central memory of 16 Mb, and 4 Gb on disc. Communications are conducted through a front-end DATANET.

The terminal computers at the moment are microcomputers of the kind PC compatible, with operating system MSDOS and a recommended configuration of 640 Kb of central memory, harddisc, colour graphic screen and a modem. The modem must support the V22 (full duplex 1200 baud) and V23 (videotext, 1200/75 baud) standards, since both protocols are used in the XTEC. At the present Kortex 1200 boards are used as internal modems.

The different services of the XTEC take place under two different protocols or communication modes, both of asincron kind. One of them is the videotext and the other full duplex V22.

The videotex transmission has as special advantages the existence of international standards of encoding that tend to optimize the transmission of information, and of specially favourable rating by the state Telephonic company, which make the videotext a sociological option for telematic communication. Working through videotex can take place under different international rules. Nowadays the XTEC system works under the CEPT2 standard. At the begining of the 1.989/90 academic year the service will change to CEPT1 standard, which is officially adopted in Spain, without the change implying oversignificant differences for the users. The full duplex transmission has as its main adavantages, its grater technical power and its suitability for the bidirectional transmission of great amounts of information.

The transport network that is used at present in the XTEC service is the normal voice telephonic network, the same one that is used for normal telephones. In the near future, it will evolve toward the use of a network specialized on data support IBERPAC, which offers more security and, very often, lesser costs. Entry to IBERPAC network will be made from the voice telephonic network, through special doors made avialable for this purpose (DEP's and CAI's), which means that users won't have to change their installations when the telephonic transport network is changed.

5. Practical experience. Present educational activities and perspective of evolution.

The initial setting up of a project like XTEC was complex. The installation of the central computer, although complex, was not a special problem. More complicated was the development of the initial applications as this system has been widely used in financial and business institutions - ammong others - but our project is singular in using a DPS8 environment. So, the computer was installed in March 1.988, and the service to the schools was initiated with the academic year 1.988/89. The period March-September was also profited for a complicated operation of installing specific telephonic lines in the schools.

The initial educational or organitzational difficulties which a project like XTEC finds are the low degree of information, formation and familiarization which the potential users of the network have.

The fight against this difficulty is long and tough and is the combination of different activities: Information campaigns addressed to the principals and the computer science coordinators of the schools. Modular in-service courses at two different levels : A basic level (4 sessions of 3 h each) to get a user familiarized with the basic philosophy, ways of access and applications available and a deeper level (12 sessions of 3 h) for those who require more advanced information and concepts. These formation activities will continue in the following years and will be complemented by other possibilities (CAL courses, seminars, ...).

A special factor was to inform the principals of the schools about the costs of the telephone, as in many cases the fear of incontrolled excessive expenditure prevented the schools to work with XTEC.

The initial strategy has been to develop basic applications that respond mainly to the needs of the teachers, as the effort of formation began specifically with them. Now we are shifting this emphasis and new applications are being designed which will be addressed to the students: An open context for a collective construction by students of a Documental Data Base related with the cellebration of the 1.000 years of Catalonia; or convivial environments for multi-user on-line dialogue. Also, the design of the initial applications has been done exclusively by the XTEC central work team, and new applications will be done with the collaboration and ideas of users.

The active implication of the users in XTEC is essential for the success of the project: Educational institutions are beign invited to provide information for the news bulletin or the Documental Data Base, or to organize open discussions or forums. But this idea is not easy to implement: Technical tools have to be easy to use and ergonomic, quality control has to be high and familiarization of the users - even those with high educational experience - is hard to achieve. But the fact that the way is long does not mean that it is impossible to cover it. Step by step, the work is being done and new milestones will be the reward.

6. Conclusions.

This paper cannot be finished without an optimistic appraisal of the future of the telematic services, and of the XTEC in particular, in education. Telematics is a technology that will experience a very strong boom in the next few years as regards its insertion into a great number of social sectors, among which education stands out. The concept of a virtual village, supported, as we've seen, by telematics, is specially useful and attractive in a system like Education one of whose goals is to help us all to be more united and communicative.

TELECOMMUNICATION IN EDUCATION: NOT ONLY FOR PUPILS. TEACHERS DESERVE ITS ITS HELP TOO

Moshe Chasid, Bar-Ilan University, ISRAEL

An Experimental Project has been running for the last two years ,by Bar-Ilan University staff From Israel, in a Jewish day school in North-America, for bringing forth the use of computers in Jewish studies. The project dealing mainly with teacher's Inservice Training has reached the point of expanding into the world of Telecommunication. This endeavor is seen not only as a new, fast, powerful way for communicating between parties, but rather as part and parcel of the philosophical assumptions underlying the project itself and of the accumulation of insights made in Curriculum Development research and School Improvement Research.

The use of computers in education is seen by many educational researchers as an innovation or as a change in schools, therefore dealing with it should be through the perspective of research in school improvement and change. (Heywood and Norman, 1988; Hativa, 1988; Griffin, 1988)

Ingvarson and Mackenzie (1988) claim that "Major research studies in the school improvement literature include the Rand study "Federal Programs Supporting Educational Change" (Berman and Mclaughlin, 1978). As many others, following the Rand study's line of research Fullan (1987) provides a framework of factors influencing implementation of educational changes and innovations. The following are several of the factors described: Ongoing inservice and assistance. Monitoring and problem-solving. Fullan (1982) states that "The absence of follow-up after workshops is without doubt the greatest single problem in contemporary professional development". Huberman and Miles (1984) claim that "large scale, change bearing innovations lived or died by the amount and quality of assistance that their users received once the change process was underway".

The project described in this paper has seen as its main contribution to go forth according to the insights of the above studies and to plan the implementation of the computer use in Jewish studies in a special way. We did not want to run one more common inservice training of teachers held for individual teachers pulled out of their schools, learning theoretical or non practical lessons in educational computing, mostly programming and the use of tutorials.
Instead, the project was planned as a School Based Curriculum Development, not only in regards of the site of the INSET which was for the whole Jewish Studies staff in their own school, but also by choosing the direction of training. The teachers learnt the use of several "Mini-Authoring-Systems" by which they could develop their own computerized learning units tailored for the specific needs of their class.

Three out of the four intensive seminars were held during the ongoing schoolyear and were entwined into the day to day instruction of the same teachers in their classes and so could enable the immediate testing and evaluation of ideas and the use of developed materials in the classrooms with "live audience" attending. All of the described components of the change strategy stem from the philosophy of the SBCD.
As mentioned above, one of the most emphasized factors in such a strategy is the ongoing support and assistance given to the teachers and the school, once the innovative implementation has begun. Although The above strategy builds a most important support system in the school itself, by creating a whole team of excited teachers assisting and supporting one another (so differently from the common state of one or two lone teachers coming back from some inservice course and fighting as "Don Quixote" against ....) ,the point has arrived where the utmost realization of the above curricular and educational philosophy could be helped by the technology of Telecommunication.

Telecommunication can assist such a project by fulfilling the desires of teachers in the school and of the academic training staff to keep on with the guidance assistance and support all through the school year and not only in the peak moments of the intensive seminars. A Telecommunication-System was setup last January through the auspices of "GESHERNET" a Jewish educational network, enabling us to bridge the gaps of time and space which are usually so hard on such overseas or even overinstitution projects.

The development of the Curricular Support Telecommunication System Between Bar-Ilan University and schools joining the project is seen as a three stage launch. Stage one, the establishment of the "private" connection of one school with the center for guidance, support, ongoing discussion of ideas, evaluation of self made materials and their impact etc. .

The second stage would be the joining of several schools into a network, on which conferences would deal with the exchanging of advice, ideas, materials etc. between schools with mutual points of interest.

The third stage, once a critical mass of schools have joined the project and the network, would be of setting up a "Data-Base" or Resource center for computerized learning and instruction materials.

As an upspring of such a system, after teachers have learnt the secrets of the technology, Telecommunication penpals between pupils would be a most natural thing.

It may be that one of the topics kids would mention would be the last computerized Jewish lesson held in their class by their own teacher. "Were does he get all those new ideas from?"

Bibliography:

Fullan M. The Meaning of Educational Change. New York: Teachers College Press. 1982

Fullan M. Implementing Educational Change. What We Know. Paper Prepared for the World Bank. Washington DC. 1987

Griffin J.A. CAL Innovations As Viewed By Purchasers of Computer Software in Secondary Schools. J. of Computer Assisted Learning 4(3) pp. 150-161 1988.

Hativa N. Computers in Education in Israel- From Where and Whereto. Maase-Chosev 15(3) pp. 59-68. Oct. 1988 (Heb.)

Heywood G. and Norman P., Problems of Educational Innovation: The Primary Teacher's Response To Using The Microcomputer. J. Of Computer Assisted Learning. 4(1) pp. 34- .1984

Huberman A.M. and Miles M.B. Innovation Up Close: How School Improvement Works. New York: Plenum Books. 1984

Ingvarson L. and Mackenzie D. Factors Affecting the IMpact of Inservice Courses for Teachers: Implications for Policy. Teaching and Teacher Education 4(2) pp. 139-155 1988.

TELECOMMUNICATIONS AS A TOOL TO IMPROVE TEACHING/LEARNING OF AGRO-BIOLOGICAL SCIENCES

Amos Dreyfus, Benjamin Feinstein, The Hebrew University, ISRAEL

The biology curriculum of the Israeli rural secondary schools has a strong agricultural orientation. Called "Sciences of Life and Agriculture" it is actually an agrobiological curriculum. In other words, it puts its main emphasis on the biological basis of agrotechnical procedures, on the application of biological principles in agriculture.

It also concentrates on the interaction between biology and other areas of knowledge, such as economics, in the process of decision making in agriculture.

According to the views of the developers of the curriculum, agrobiology must be introduced at shool as a scientific area in which decisions are made, hypotheses are verified and problems are solved on the basis of **quantitative empirical data**. Agrobiological education should therefore deal with various phases of the gathering, processing and analysis of data. With these objectives in mind we have developed, at the **Department of Agricultural Education** of the Hebrew University of Jerusalem, a series of educational computerised activities. In these units, the pupils are confronted with a problem of biological, and/or economical, and /or agrotechnical character, and use an electronic spreadsheet (mainly Lotus 123) as a tool for coping with quantitative data. So far, the pupils have had no access to the real, authentic, data bases, and have had no opportunities to deal with on-line or on-time data. This is why, hoping to widen the scope of pupils' activities, we have been analysing the educational potential of telecommunications and its adaptability to our project, in the local set-up.

We could use telecommunications at three levels at least:

a) the withinschoollevel;

b) at the "betweenschools" level;

c) at the level of communication with the data bases of external organisations.(see fig. 1.)

The "within school" level

An agricultural secondary school includes several different types ofpotential "stations", where pupils' computers or terminals could function in a school -network, such as:

a) the classroom, where individual, or groups of, pupils, could take part in the activities of the network;

b) the agricultural branches of the schoool farm (cowshed, poultryshed, etc), where the pupils specialize in a specific agrotechnical area.

These branches are becoming more and more computerized and begin to utilise the sophisticated software which is and has been developed by professional organisations. These branches produce daily a great amount of authentic, empiric, quantitative data which can be analysed by the pupils, and used in various decision-making activities. Such data are obviously the basis for pupils' learning in the farm; however, they could be telecommunicated and therefore become the basis for the studies of other pupils, who do not take part in the actual work of the branch;

c) most of the rural schools in this country are not agricultural, in the sense that they have no school farm. However, many of them have developed sophisticated, computerized green houses which, while demanding only a limited area, are able to produce continuously a great amount of experimental data. That type of data could be used nearly as efficiently as the ones yielded by the school-farm;

d) the school laboratories, where experimental data are produced and could serve more than one class (one which would actually perform the experiment and others to whom data would be telecommunicated).

e) the school library, where data are stored and should be available to all the "stations" in the school, or in other words should be quickly and efficiently retrievable from all the stations.

The classroom working station, when connected with the other stations of such a school-network, could really become a center of problem solving which would fit the educational philosophy of the developers of the curriculum.

It could also facilitate various types of cooperative exploratory projects, or lab activities, or invitations to enquiry, or observations, involving the various groups of the classroom network, in which each of the cooperating group would perform a different task, adapted to the needs and abilities of the pupils; the whole task of the class would be the sum of all the group contributions.

In this way we would hope to improve cooperation among pupils, to develop skills in effective communication and to enhance the pupils' understanding of the nature of real data, as well as of the related problems.

Between schools networks

These are networks in which different schools are connected together. They would make possible for any school in the network, to exploit the data from other schools, thus making the facilities in one school available to the others.

Such networks would enhance cooperative projects involving pupils of different schools (data from different school farms) or from different areas(e.g.ecological, statistical data),in which each cooperating group or pupil would contribute to the project and the whole project would, again, be the sum of all the contributions. The central idea, from the point of view of the pupil would be "Never mind where you are, you can always obtain the necessary data from your peers in one of the schools of the network". Also, such a network would make possible exchanges of ideas between pupils at the various stations of the network; for example "has anyone any idea why X,Y, happened in our fields, why results did not confirm expectations, or how we could organise work in the fields or verify hypothesis X, Y?" or "What would you do in our place, what is in your opinion the solution to problem X?"; "Never mind", would the pupils say, "how small our class is, how isolated we are, there are, somewhere in the network, peers with whom we may discuss problems". The main educational outcome of the establishment of those networks would thus be the expansion of the size of the discussion groups.

Such a system would also assist in the efficient exloitation of simulations of professional extension networks: the pupils might apply to a "specialist" outside their school. This specialist could be a teacher, in one of the schools, who specialised in a certain topic, and would be connected with the network, or even a specialist of an extension organisation.

"If you are able to ask the right question, it will be very easy to reach a specialist who will answer you QUICKLY."

Finally,interschool competitions or games could be easily organised.

Communication with the data bases of external organisations educational or others

The main outcome of the establishment of such networks would be, for the pupils, direct contact with the data bases of public libraries or other central organisations, meaning direct contact with authentic reports or other bibliographic items; with authentic quantitative data from literature, from data bases, from scientific reports, from actual experiments, from governmental agencies, etc.. This could assist mainly pupils involved in various types of research projects. The easy access to data bases at different levels (specially designed for pupils or not) should not only assist in the development of the knowledge of the pupils,

but also improve their skills in communicating with data bases, and their abilities in the production and organisation of information, and in making decisions on the basis of such information.

The contribution of telecommunications to science education: an approach

From a technological point of view, the objectives presented above are within reach of our educational system. But we are already well aware of quite a number of problems in the implementation of such an educational system. These problems are related to the training of the pupils and of the teachers, and are inherent in any attempt to effect far-reaching changes in the educational approach of experienced teachers and of the existing educational institutions. There are problems of adoption of pedagogical objectives, ofchange in the role perception of the teachers, of organisational adaptation of the educational institutions to the demands of the new educational technologies, of adaptation of the suggested methods to the needs and abilities of various and heterogeneous target populations, etc ... The financially expensive introduction of telecommunications in education can therefore be justified only on the basis of its potential educational contribution. In our view, Telecommunications are important mainly because they deal with communications, and not because they represent a modern and highly technological activity. Not because they make possible technological realisations which twenty years ago would have been, at the school level, quite unrealistic, but because they enhance the development of important communication skills.

SKILLS OF COMMUNICATION ARE ONE OF THE MAIN OBJECTIVES OF SCIENCE EDUCATION.

If you are able to communicate clearly, then you understand the contents that you are transmitting and you are able to make yourself understood. The invaluable advantages of the systems of telecommunications are twofold: Firstly, they provide the pupil with nearly instant feedback; secondly, since the interlocuters do not meet each other, communication must be performed without the assistance of facial expression, body language or other features of direct human contact. All the skills which make the scientific report clear, short and unambiguous must therefore be mastered, in order to make communication possible, since the success of the process of communication will depend entirely on the quality of a formally formulated message.

1)The data to be transmitted must be organised efficiently, so as to be as intelligible as possible; the pupils must become used:

to know exactly what they are trying to convey;
to select and organise (graphs, tables) data efficiently: titles, data labels, graph axes must be clearly defined; the tables must be organised concisely; the text must concentrate on the main points and these main points made sufficiently explicit. Since the pupils do not see their interlocutor, the quick and authentic feedback they receive will be a kind of objective evaluation of their ability to make themselves understood.

2) When receiving messages, pupils should check if:...
they understand the message; they can tell the sender exactly what and why they do not understand; they can ask him to correct some details of his report; they can suggest other ways to do things.

3) The direct contact with authentic data bases,
where data are organised in some formal way, will also raise some meaningful questions: are the pupils able to communicate with the data base? to ask it questions which can be answered?
to organise their questions so as to "speak efficiently" with the data base? do they understand its answers? Can they select relevant data out of what they have obtained and organise the processing of that data?

4) To communicate is to cooperate.
The pupils must assess their ability to organise cooperation so as to plan the task of all the cooperators in the network, and be able to build the outcome of their cooperation, as a synthesis of the outcomes of of the partial tasks. Are they able to explain to their associates what they need, or to understand what they need?
When they discuss with someone or apply to someone, are their arguments formulated intelligibly?
Are they able to exchange information in an on-line, or nearly so, transmission system? Are they able to make and discuss decisions on the basis of data which are transmitted and received without direct contact with the participants in the discussion?
If they can do all that by means of telecommunications, then they can express themselves intelligently and intelligibly in an area of science, which means they have a clear understanding of the science they have been learning. Such an achievement would justify the investment of money and efforts in educational telecommunications.

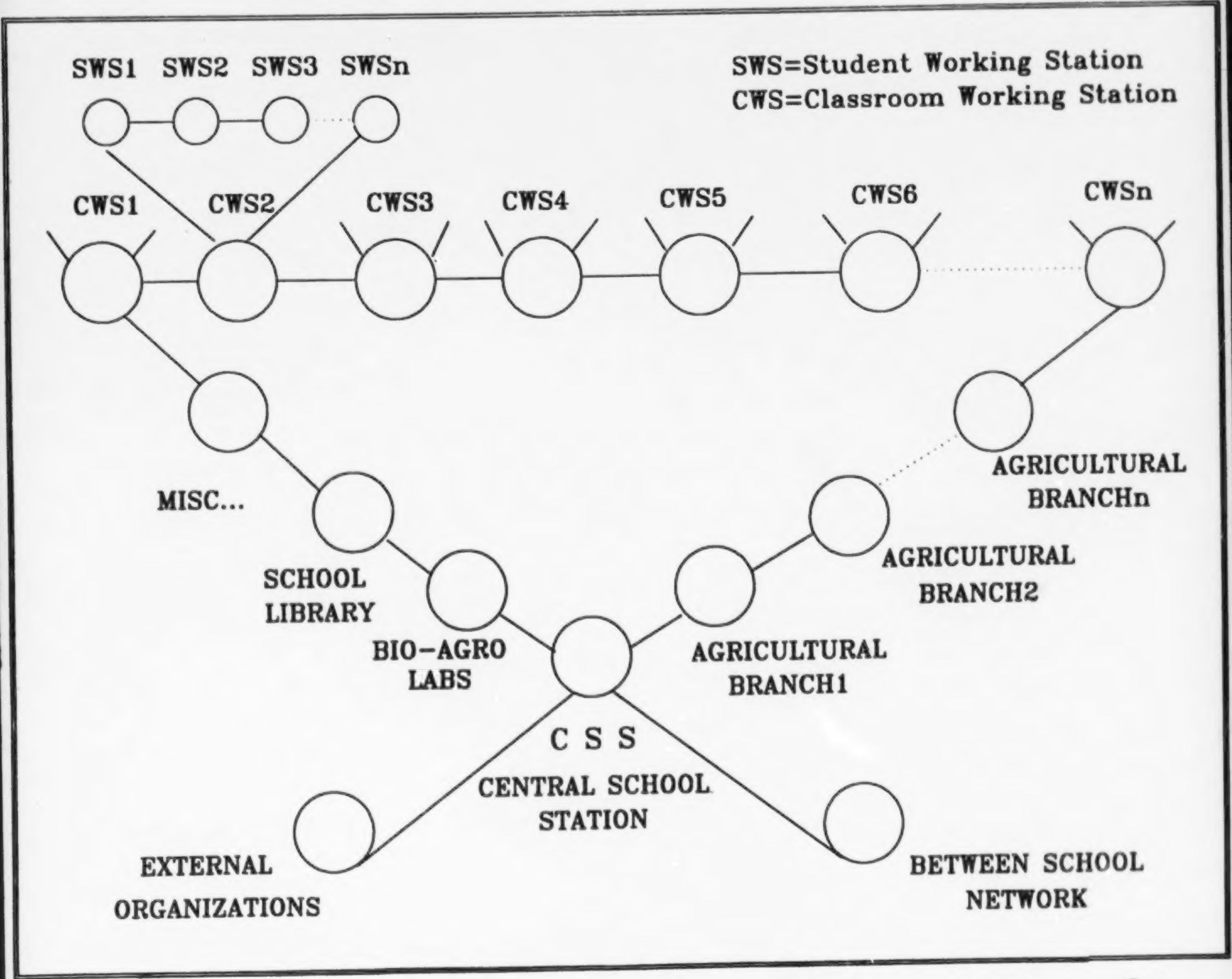

SWS1
SWS2
SWS3
SWSn
SWS=Student Working Station
CWS=Classroom Working Station
CWS1
CWS2
CWS3
CWS4
CWS5
CWS6
CWSn
MISC...
SCHOOL LIBRARY
BIO-AGRO LABS
AGRICULTURAL BRANCH1
AGRICULTURAL BRANCH2
AGRICULTURAL BRANCHn
C S S
CENTRAL SCHOOL STATION
EXTERNAL ORGANIZATIONS
BETWEEN SCHOOL NETWORK

FIG.1 The telecommunication potential connection of the pupils in rural high schools

THE APPLE GLOBAL EDUCATION PROJECT

Martin Engel, Apple Computer Inc., U.S.A.

I would like to introduce myself and to explain the point of the AGE project.

We want to link the students (and their teachers) of the whole world together on an electronic network that utilizes the APPLE MACINTOSH computer and a highly graphic and very easy-to-use software program called APPLELINK which provides for electronic mail and bulletin boards. This telecommunications software has been created specifically to utilize the power of the Macintosh. Over this network, it will be possible to send mail, text files, graphic and pictorial information. The AppleLink network now supports 30,000 addresses worldwide. Owned and operated by Apple, this network has, until now, been used primarily for business purposes. Apple Computer is active in over 100 countries.

AGE will include schools from every country in the world, from the first grade, through high school. Surely the 21st century, which begins in 10 1/2 years, will be the beginning of a new global era. We will need, more than ever before, to learn about and develop mutual respect for the many diverse cultures that the human race represents. We must also learn to work together; to cooperate, to build economic, political and social bridges. We must build what Marshall McLuhan once called: *The Electronic Global Village*.

I work in the Advanced Technology Group here at Apple Computer Inc. , in Cupertino, California. I created the Apple Classroom Of Tomorrow (ACOT) project several years ago. The Apple Global Education (AGE) project is my new effort.

Initial enthusiasm for the AGE project is tremendous. We really believe that it is the dawning of a new AGE. We will have well over 70 sites in Canada, the U.S. and Europe installed by the end of 1989. We are aiming for a global network of 1000 schools by 1992. The theme of the project is: **Connecting the students of the world together.**

The Apple Global Education (A.G.E.) Network

AGE Synonyms:

- •Pan-National Network
- •Global Student Telecommunications
- •Planetary Pedagogy
- •The World Classroom
- •The Global Classroom
- •Intercontinental Education
- •"The Electronic Global Village" - Marshall McLuhan

Purpose of this Project:

To create a Macintosh based global communication capability for teachers, educators and children to learn and exchange ideas and information. The intent is to create a global education network which facilitates:

- communication among teachers to share curricular and pedagogical problems and solutions
- communication among educators about innovative use of technology to enhance the educational process
- communication among children around the world to enhance their understanding of the global community and connection to one another

The Vision:

Over a long term (5-10 year) time horizon, to create a transnational network which will connect thousands of schools, teachers and students around the world. Possible specific uses of this network include:

for educators and teachers
- comparing, sharing and developing innovative teaching methods
- discussing/reviewing software and hardware used in the classroom
- global, multi-lingual, multi-cultural curriculum development

for students
- exchanging project work by students on common topics
- "electronic pen pals" -- exchanging information on countries, governments, cultures and lifestyles
- simulating real-world situations
- encouraging renewed interest and new perspectives in geography, social sciences, history, foreign language, etc. by providing a new vehicle for exploration
- providing access to new curricula and projects of macro issues

Start-Up

The initial stage will target 100 sites by Summer 1990

Apple Corporation Sales/marketing organizations operate in three geographic regions (U.S., Europe, Pacific). It is their responsibility to identify and support candidate schools in their respective countries. At the same time, interested individual schools can initiate a request for participation to their local Apple Sales offices.

Our goal is to have at least 2 schools in each of the five geographic operating regions of Apple Computer in the US, and at least two in each country in the rest of the world. All pre-collegiate schools are eligible, as are student learning environments like Children's Museums and libaries.

There are some limitations to the telephone access that is essential for AppleLink data in certain overseas countries right now, but Apple Computer, Inc. is working to overcome those obstacles.

Identification of a champion teacher/administrator at each candidate site is critical. Experience/leadership in use of technology, especially Macintosh, is highly desirable.

If identified and selected by the local Apple Sales office or IMC, the candidate school must submit a brief (two pages) proposal to us here in Cupertino (see address below) which will include the following information:

•possible ways, projects and activities in which this network access would be used. (two pages)

•precise and detailed information about the school: (name, address, telephone number, location, nearest large city, number of students, teachers, type of school, grade levels, present computer use, who the teacher/leader is, etc.)(one page)

Final site selection is made collaboratively by AGE team in Cupertino and the Apple education field managers. This is not a grants competition. We seek schools that are identified AND WILL BE SUPPORTED by the Apple field managers.

This is not a one-time only project. It is the installation of a global telecommunications network that will remain permanently in place and can be used continuously at the discretion of the participating schools.

Program benefits

For teachers.

It can be lonely on the "cutting edge" of education. Innovative teachers and educators who are struggling to make a difference, often with little financial or emotional support at the local level, will benefit from belonging to a global community. This network will provide a much needed forum to develop and share ideas and a vehicle to demonstrate the value of technology "beyond drill and practice".

For kids.

Preparing our children to be active participants in a world that is increasingly globally interdependent and technologically advanced is an important responsibility of our education system, and our society. This network would provide them access to new information, new perspectives and new cultures. Research has shown that learning is, in some dimension, a social, interactive process. Given the opportunity, children are eager collaborative learners. Our curiosity about and interest in the rest of the world is increasing even as student knowledge of that world remains modest. Example: Instead of students only reading about distant lands in NATIONAL GEOGRAPHIC, the AGE project will provide student connectivity and interactivity with the students of those many countries. The AGE project will contribute to reducing the negative impact of the word: "FOREIGN!"

Stages of Development:

Phase I:
- Building the platform. "Getting the plumbing out there!"
- Target: 100 schools by October 1, 1990
  1000 schools by 1992

Phase II:
- Building curriculum project guidelines for the AGE Bulletin Board
- Creating new curriculum activities appropriate to the Macintosh and communication between broadly diverse cultures
- Porting and developing the best existing network projects into a Macintosh environment

Phase III:
- Conducting formative research to make global telecommunication breakthroughs in education

Criteria for Phase II curriculum projects and activities:

- Multi-cultural
- Multi-national
- Multi-lingual
- Macintosh based
- AppleLink based

Basic Development Steps of the AGE Network:

1. Apple stimulates the creation of the Macintosh/AppleLink platform
2. Curriculum activities and projects are placed on the AGE bulletin board
3. Internationally recognized education telecommunication experts join the network
4. Telecommunication projects that have been operating on other networks join the AGE network
5. New curriculum that is Macintosh based will be developed
6. Evaluation and research is conducted on the AGE network

Program Costs:

The communications connection is via the AppleLink network which is supported by the General Electric Information Services. The host mainframe is in Cleveland, Ohio. The carrier is MarkNet.

A Macintosh SE w/HD20, modem and either an Imagewriter or Laserwriter printer are essential. A hard disc is recommended to allow flexibility downloading large files. Many selected schools may already have required hardware.

Administration:

The program was conceived and is being administered by a single person in Cupertino, Dr. Martin Engel. Time commitment from local champions in the Apple /Distributor, Sales/Marketing organizations of sponsoring countries to support each site will be minimal. The AGE project operates within the Advanced Technlogoy Group at Apple Computer, responsible for research and development.

AppleLink Note:

The AppleLink electronic mail and bulletin board interface is the most graphic and easy to use program among the many now available networks. Despite its great power, it does not require computer knowledge beyond what all Macintosh users now can do. We expect first and second grade students to be as actively involved as high school students. There is a group address for all AGE participants as well as an AGE Bulletin Board.

Criteria and conditions of participation for each start-up site:

1. Each site must have a dedicated and committed *CHAMPION*. This person can be either a classroom teacher, or computer coordinator. It must be someone who can give time to the implementation, and is willing and able to work with teachers and students to develop a variety of programs that utilize this network. The champion must be able to read and write English with fluency. (Eventually the network will operate in a multi-lingual mode.)

2. There must be explicit support from the administrative head of the school and the school jurisdiction ("school district" in the US)

3. Technology in education experience. The school should exemplify leading edge thinking in a variety of educational practices.

4. Site either already has, or will obtain from the local Apple office, a Macintosh SE, printer, and modem. While this system need not be dedicated exclusively to the AGE project, it must be available primarily for that purpose.

5. A phone line into the school/classroom that will be used as the data line, without any bureaucratic obstacles. It is critical to the success of this project that students have ready access to the system and its data line connection. The terminal should not sit on some Principal's desk, or under lock and key.

6. Alternatively, the AGE network will be enhanced to the degree that "exotic" sites participate. One example is the school located on Baffin Island with an Inuit Eskimo student population. Linking highly diverse student populations from highly diverse cultural backgrounds will be a major strength of the network.

7. The site must write a two page proposal. It must be in English and may be developed with local Apple assistance. The proposal should describe what uses this network will serve the school, what programs they might develop, etc. A third page should be a school profile describing the present technologies in the school, number of students, teachers, grade levels, curricular emphases, demographic and community characteristics, geographic location.

8. Perhaps most important is the commitment of the school to global telecommunications as an opportunity for curriculum development and student learning.

The implementation process:

1. Local Apple offices identify several school site candidates. Schools wishing to participate, must communicate their interests to the local Apple Sales offices.

2. The school prepares the three page document which will be sent to AGE offices at Apple Computer, Cupertino. In the US, we will make final choices based upon equitable geographical and grade level distribution. All non-US schools can be included immediately.

3. We will communicate the decision back to the local Apple offices and the school. The response time from us may be immediate or it may take a long time, depending upon the appropriateness of location and participating grade levels of the applicant school.

4. We will need to know the name, business address and the AppleLink address of the Apple education account executive or dealer responsible for the particular school that is applying. We will also need to know the name of the nearest large city. The school should also provide their own precise name and address.

5. The local Apple representative obtains and provides an AppleLink address if the school does not yet have one. When this is accomplished, the AGE Cupertino office will secure participation in the AGE group address.

Conditions for participation:

1. The school expresses its willingness to purchase all necessary hardware and cover all telephone connect costs to use the AppleLink address.

2. The local Apple offices assume some burden of support for the school to participate in the AGE network. This may include both hardware and software, as well as AppleLink connect costs.

Why do it?

- Schools need new tools to do their job.

- Information technologies will dominate the 21st century world wide.

- Students need this world-wide connectivity more than ever. "It's a small world!!" The European Community becomes a reality in 1992. The Pacific Rim will be the world economic leader in the next century.

- World wide telecommunication creates enormous opportunities for new computer based curricula, developing cross-national study groups and projects, and building new interest in geography, geopolitics, macro-economics, world history, foreign languages.

- Apple plays leadership role as responsible world citizen and member of world community.

At this moment, there are over 70 schools in 22 countries involved in the AGE network. We are negotiating with several curriculum providers who will utilize the AGE bulletin board and the AGE network to distribute and manage the curriculum. GREENPEACE is one of these. The AGE bulletin board can be read by any AppleLink user.

COMPUTER PALS ACROSS THE WORLD PROJECT
A BOTTOM-UP APPROACH TO TELECOMMUNICATIONS IN EDUCATION

David K. Chapple, Computer Pals Across the World Inc., New Zeland

Computers, when used by thinking teachers, are powerful learning tools. They enable students to accomplish tasks and learn in a way never before possible. The power of the wordprocessor, the spread sheet and database is well known by students of all ages and across many education systems. Interactive fiction and simulations provide the learner with stimulating problem solving experiences. There is no doubt that computers have the propensity to empower the young learner as never before. Argueably perhaps, but one of the most empowering uses to which the computer may be put in the learning environment is as a communications tool. It has the power to make accessible to the learner more information than can be found in the largest of libraries. It also has the power to open up the entire world by instantly putting people, in even the most remote parts of the Earth, in touch with each other. It is the latter use which the Computer Pals Across the World Project supports.

The Computer Pals Project is an effort to co-ordinate and encourage telecommunications between schools around the world so that learners in whatever kind of learning institution may derive the greatest benefit possible from the computer/modem technology. The emphasis is on "co-ordinate" because some schools enter into the world of international telecommunications in an ad hoc way. usually through the efforts of teachers who have a particular interest in the computer/modem technology and overseas contacts with like-minded teacher. These people are the pioneers. Any new field needs such people to go ahead and forge the way. Although very much valuable work is done during the pioneer phase it is characterised by trial and error. Successes are stumbled on, often unexpectedly by experimentation. But for every success there are likely to be many failures.

What the Computer Pals Project is doing is charting the new field, building the shelters and organising the social fabric. The project puts electronic mailing within the grasp of *any* educator who wants to use it, not just "wire-heads". Through its organisation it:

a) helps educators appreciate where the technology fits into education on a philosophic level,
b) establishes suitable sister school relationships between schools in different countries,
c) disseminates successful email experiences,
d) supports teachers in the technical aspects of telecommunications.

The Philosophy Underpinning the Project.

Language theorists and teachers speak about top-down models of instruction vis a vis bottom-up models. This construct fits the the use of telecommunications in education very snugly. The Computer Pals Project is an example of a bottom-up approach to telecommunications.

In the top-down model as applied to telecommunications we have a solution looking for a problem. That is to say a telecommunications system is built and teachers and students are encouraged to find a way to integrate it into classroom programmes. The bottom-up model on the other hand begins with a need and looks for a methodology which will meet it. The problem one hears in the system driven top-down world is of the difficulty system designers have in encouraging teachers and students to actually use the technology. There is never any consumer resistance in the bottom-up model since both the student and the teacher, the clients, identify a need in the first place. The "marketing" problem which bedevils the other model in simply not there.

That is the stance adopted by the Computer Pals Project. The fact that learners in this environment use the computer/modem technology arises out of a need to communicate. The activity is user driven. It is simply a matter of convenience that teachers and students in the Project use the global services of Dialcom. The Project focuses on a notion about learning, that is to say, students can learn so much from other students especially when they are continents apart and that through global communications the relevance of the curriculum can be tremendously enhanced.

Sister Schools.

One of the functions of the Project is to arrange matches between schools throughout the World. Matched schools are encouraged to sustain their contact over a significant period of time, a year or more. It is valuable, especially for the teachers, to get to know each other. They can learn a great deal about each others classes, their teaching styles and their understandings about education. This knowledge is particularly useful when planning the communications activity for their students. When the teachers know each other well the link can be sustained from year to year and outlasts classes.
Another reason why schools are encouraged to sustain their contact is that the quality of the exchanges between classes increases with time. This is when the most innovative work begins to appear.

To facilitate the matching of schools Computer Pals Across the World maintains a network of directors in some fifteen countries. One of their functions is to match schools. The directors will usually establish the country of first choice before matching a local school with one overseas. They will also try to establish what type of school is sought for the match, whether a primary or secondary school and whether an urban or a rural school.

Another of their functions as they are matching schools is to let the teachers know of the philosophy upon which the project is based. The term "computer pals" may leave one with the notion that the Project is a clearing house for "electronic" pen friends. Directors clearly have the responsibility to lead teachers and students past this level of superficiality and help them understand how the technology can enrichen learning and make the curriculum more interesting and relevant.

Information Sharing.

A real strength of the Project is the production of a newsletter about four times a year. This contains reports from teachers and students on their activities. In this way ideas are able to be shared and taken up by others. The newsletter also conveys information on the development and growth of the Project as well as thought provoking articles on electronic mailing in education. The directors are responsible for keeping a directory of the participating schools in their country. Thus they are able to mail out the newsletter and solicit articles where they know there is something to share.

Each year the Project organises an international conference to which leaders in the field of telecommunications in education, teachers and academics alike, deliver papers and take workshops and seminars. Since the the first International Computer Pals Across the World Conference was held in Alice Springs, Australia, in 1988 others have been held or are planned for Portland, Oregon (1989), Cairns, Australia (1990), West Germany (1991). Conference proceedings in which significant papers are published are produced for each conference.

Help and Support.

From time to time students and teachers will experience difficulties in communicating. These might be related to the hardware, the system, the software, or an intervening vacation period. The directors are there to sort out the problem and help re-establish the link.

The Project had its beginnings in 1982. Mr Malcolm Beazley, Head of English at Turramurra High School, on the outskirts of Sydney saw the tremendous advantage it would be for his students to correspond electronically with a school on the north slope of Alaska with which they had been corresponding by the slow conventional means. The time it took for letters to go between the two schools destroyed much of the value of the experience. Beazley discussed with Mr Jim Erwin, and educational computer consultant working out of Barrow, the possibility of using electronic means.

After much discussion and with the help and support of OTC and TYMNET the first links were made between Turramurra High School and Alak High School in 1983. The project which developed was initially known as the Australaskan Writing Project. As it grew to include schools in other countries it was renamed Computer Pals Across the World.

In spite of the name change it has remained conceptually the same. The aims which were established in 1983 are still the aims today. They are:

a) to provide students with a real context in which they can improve their written communication skills.

b) to provide an opportunity for cultural exchange through reading and writing.

c) to motivate the linguistically less able student.

d) to provide an opportunity for students to develop their keyboard skills

e) to familiarize students with the use of international telecommunications.

f) to liberate people from isolation caused by physical and emotional handicap and geographical location.

g) to assist students in second language learning.

Though the aims might have remained the same the Project has become very diverse. In the first place the focus was on Writing for a Real Reason and a broad structure based on progressive stages was followed. The stages began with getting to know each other and progressed through journalism to discussion of social issues. While it is only natural for students to begin by getting to know each other the stages have simply become writing activities and have been added to as teachers and students have gained experience.

Today, however, the project has many other focuses besides "writing for a real reason". They include:

a) Hearing and Seeing in a New Way, which as the title suggests links up deaf and blind students.

b) Gifted and Talented Exchange, aimed at extending the intellectual and creative abilities of exceptional students.

c) Computer Pals in Hospitals. This is a recent development which caters for children in hospital classes. Some interesting experiences are beginning to emerge as hitherto isolated students are able to share in each others situation.

d) International Study of Adolescence. Students explore what it is like growing up in different countries and compare the insights gained with their own experiences.

e) Foreign Language Exchange. Japanese, French and Australian children have engaged in learning each other's language; students teaching students in a real context.

The Project costs money to run and a time commitment from a lot of people. Computer Pals Across the World is extremely fortunate to be sponsored financially by Epson Australia Ltd and supported by the telecom network, Dialcom.

Enquiries regarding the Computer Pals Across the World Project should be directed to the Project Director, Computer Pals Across the World Inc, P.O.Box 280, Manly, N.S.W. 2095, Australia. The on-line address is 6007:EWP002.

THE WORLDLINK PROJECT

William D. Gattis, Tandy Corporation/Radio Shack, U.S.A.

WE'VE RECENTLY COMPETED THE 6TH ANNUAL INTERNATIONAL CONFERENCE ON TECHNOLOGY AND EDUCATION IN ORLANDO, FLORIDA, SPONSORED BY TANDY CORPORATION; THE UNIVERSITY OF TEXAS; THE UNIVERSITY OF EDINBURGH, SCOTLAND; MICHIGAN STATE UNIVERSITY; MICROSOFT CORPORATION; THE SCOTTISH COUNCIL FOR EDUCATIONAL TECHNOLOGY; AND A NUMBER OF OTHER INSTITUTIONS.

THE THEME OF THE ORLANDO CONFERENCE WAS "EDUCATION IN THE 90'S: CHALLENGES OF THE NEW INFORMATION TECHNOLOGIES." WE HAD APPROXIMATELY 1,000 ATTENDEES, REPRESENTING 30 NATIONS, WITH DELEGATES FROM THROUGHOUT WESTERN EUROPE, ASIA, AND AUSTRALIA, INCLUDING DELEGATIONS FROM THE SOVIET UNION AND THE PEOPLES' REPUBLIC OF CHINA.

A MAJOR THEME OF THAT CONFERENCE WAS DISTANCE LEARNING.

AND A FEATURE OF THAT PROGRAM WAS A REPORT AND A SUMMARY ON AN INNOVATIVE PROJECT CALLED WORLDLINK. FOR 90 DAYS, BEGINNING IN JANUARY AND ENDING AT THE END OF MARCH, 1989, THE WORLDLINK PROJECT LINKED STUDENTS AND TEACHERS IN OVER 120 SCHOOLS WORLDWIDE, IN A SERIES OF COOPERATIVE INSTRUCTIONAL ACTIVITIES USING PERSONAL COMPUTERS AND THE MCGRAW-HILL MIX TELECOMMUNICATIONS NETWORK.

THE WORLDLINK EXPERIMENT HAD AN EXTREMELY STRONG RESPONSE FROM AROUND THE WORLD, AND WE BELIEVE THAT RESPONSE SAYS VERY CLEARLY THAT THE CONCEPT AND THE REALITY OF A GLOBAL CLASSROOM, A CLASSROOM WITHOUT WALLS, IS NOT ONLY A VERY ATTRACTIVE ONE, BUT THAT THE PROSPECT OF ACCOMPLISHING PROGRAMS SUCH AS WORLDLINK USING PERSONAL COMPUTERS ON A WIDE SCALE -- RIGHT NOW -- TODAY -- IS VERY EXCITING TO EDUCATORS.

THE WORLDLINK CONCEPT BEGAN THREE YEARS AGO IN WHAT WAS ORIGINALLY LABELED "THE CARMEL PROJECT," CARRIED OUT IN THE CARMEL SCHOOL DISTRICT IN CALIFORNIA. THAT PROJECT INVOLVED A LOCAL BULLETIN BOARD SYSTEM, WITH TELEPHONE ACCESS, AND STUDENTS WHO CARRIED PORTABLE LAP-TOP COMPUTERS WITH THEM, WHEVER THEY WENT, BOTH DURING CLASSES AND ELSEWHERE. THEY COULD ACCESS THE SYSTEM ANY TIME, DAY OR NIGHT.

THE CARMEL PROJECT EXPANDED INTO AN INTERNATIONAL PROJECT, CONDUCTED FOR THE FIRST TIME LAST YEAR, IN 1988, PRIOR TO THE FIFTH INTERNATIONAL CONFERENCE IN EDINBURGH, SCOTLAND.

THE JUST-COMPLETED 1989 WORLDLINK PROGRAM GREATLY EXPANDED LAST YEAR'S CONCEPT. NATIONS WITH SCHOOLS PARTICIPATING IN WORLDLINK THIS YEAR INCLUDED: AUSTRALIA, BELGIUM, CANADA, DENMARK, FRANCE, GREECE, IRELAND, ITALY, LUXEMBOURG, MEXICO, PORTUGAL, SPAIN, WEST GERMANY, THE NETHERLANDS, THE SOVIET UNION, THE UNITED STATES, AND THE UNITED KINGDOM INCLUDING ENGLAND, SCOTLAND, WALES, AND NORTHERN IRELAND.

THE NUMEROUS PROJECTS THAT WERE PLANNED WERE DESIGNED TO EXTEND STUDENTS' ACTIVITIES BEYOND TYPICAL PEN-PAL MESSAGES. A POPULAR EXERCISE FOR LANGUAGE STUDENTS IN U.S. SCHOOLS INVOLVED THE EXCHANGE OF MESSAGES IN FRENCH AND SPANISH WITH SCHOOLS IN THOSE COUNTRIES.

ONE OF THE MOST POPULAR FOREIGN CONTACTS FOR U.S. SCHOOLS WAS WITH STUDENTS IN TROITSK HIGH SCHOOL, NEAR MOSCOW, IN THE SOVIET UNION. ALEX CHADOVICH, A SCIENTIST FROM THE SOVIET RESEARCH FACILITY IN TROITSK, ASSISTED THE STUDENTS IN TROISK HIGH SCHOOL WITH WORLDLINK, AND ALEX WAS ABLE TO ATTEND THE ORLANDO CONFERENCE. YOU'LL SEE ALEX AND HIS COMMENTS ON THE VIDEO TAPE IN A FEW MINUTES.

THE WORLDLINK EXPERIMENT HAS ENJOYED AN UNPRECEDENTED SUCCESS IN THIS SECOND YEAR, AND HAS CAPTURED THE IMAGINATION OF STUDENTS AND TEACHERS WORLDWIDE. IT SEEMS CLEAR THAT LINKING OF STUDENTS IN SCHOOLS AROUND THE WORLD IN COOPERATIVE

LEARNING EXPERIENCES THROUGH TELECOMMUNICATIONS, OFFERS EXCITING PROMISE IN AREAS OF SOCIAL, HISTORICAL, CULTURAL, AND LANGUAGE EXPERIENCE.

PARTS OF THAT CONFERENCE WERE TELEVISED, WITH DISTRIBUTION THROUGHOUT THE U.S. AND NORTH AMERICA VIA THE WESTAR IV SATELLITE, THROUGH THE COOPERATION OF THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, AND OTHER SESSIONS WERE VIDEOTAPED FOR LATER DISTRIBUTION.

WE WERE FORTUNATE TO HAVE A NUMBER OF WORLDLINK PARTICIPANTS FROM AROUND THE WORLD AT THE ORLANDO CONFERENCE, AND ONE OF THE VIDEOTAPED SESSIONS FEATURED A PANEL DISCUSSION BY SEVERAL OF THE ATTENDING WORLDLINK PARTICIPANTS.

LISTEN TO A FEW OF THE COMMENTS ABOUT WORLDLINK AS SOME OF THE PANELISTS FROM THE NETHERLANDS, FROM SCOTLAND, FROM THE SOVIET UNION, FROM CANADA, AND FROM THE U.S. GIVE THEIR IMPRESSIONS OF THE WORLDLINK EXPERIMENT.

DAVID WALKER, DEPUTY DIRECTOR OF THE SCOTTISH COUNCIL, IS MODERATOR FOR THE WORLDLINK PANEL.

SINCE THE PRESENTATION ON WORLDLINK AT THE ORLANDO CONFERENCE, WE HAVE BEEN PRACTICALLY UNDER SIEGE FROM SCHOOLS WHO WANT TO KNOW IF WE WILL SPONSOR ANOTHER WORLDLINK PROJECT, AND WANTING TO BE INCLUDED.

THE SUCCESS OF WORLDLINK HAS DEPENDED ON THE SUPPORT AND ASSISTANCE OF A NUMBER OF ORGANIZATIONS AND INDIVIDUALS AROUND THE WORLD. THE SUPPORT OF THE SCOTTISH COUNCIL FOR EDUCATIONAL TECHNOLOGY IN PARTICULAR WAS A CATALYST THIS YEAR THAT HELPED US GREATLY EXPAND THE NUMBER OF EUROPEAN SCHOOLS PARTICIPATING.

IT'S FASCINATING TO LOOK THROUGH THE LARGE AMOUNT OF INFORMATION EXCHANGED AMONG PARTICIPATING SCHOOLS. ONE INTERESTING EXAMPLE INVOLVED THE SCHOOL IN LERWICK THAT DAVID WALKER REFERRED TO IN THE VIDEO TAPE -- THE MOST ACTIVE SCHOOL IN THE PROJECT -- AND A SCHOOL IN THE U.S.

MANY AMERICANS DON'T REALLY UNDERSTAND MUCH ABOUT THE RELATIONSHIP BETWEEN SCOTLAND, ENGLAND, NORTHERN IRELAND, WALES, AND THE UNITED KINGDOM OR GREAT BRITAIN.

A U.S. SCHOOL IN VICKSBURG, MICHIGAN, ASKED ABOUT THAT SPECIFICALLY OF THE SCOTTISH SCHOOL IN LERWICK, IN THE SHETLAND ISLANDS, AND THE RESPONSE FROM STUDENTS IN THAT SCOTTISH SCHOOL IS A FASCINATING THREE PAGES DETAILING THE HISTORY OF SCOTLAND AND ENGLAND IN A VERY READABLE WAY. THE SCOTTISH SCHOOL INVOLVED A MEMBER OF THE BRITISH PARLIAMENT IN SHETLAND IN HELPING PREPARE THEIR RESPONSE, AND THAT PARLIAMENT MEMBER WAS LATER LINKED THROUGH THE AMERICAN SCHOOL TO A U.S. CONGRESSMAN.

THE COMMENT WAS MADE THAT THOSE STUDENTS IN MICHIGAN NOT ONLY KNOW SPECIFICALLY WHERE THE SHETLAND ISLANDS ARE, BUT THAT THEY ALSO HAVE AN INSIGHT INTO THE POLITICAL BOUNDARIES AND RELATIONSHIPS IN THE UNITED KINGDOM THAT FEW AMERICANS HAVE, AND THAT THOSE AMERICAN STUDENTS WOULD HAVE NEVER OBTAINED FROM A TEXTBOOK.

PARTICIPATING U.S. STUDENTS IN THAT SCHOOL WERE AFFORDED A UNIQUE PERSPECTIVE ON A HISTORY AND CULTURE THAT HAVE AFFECTED OUR OWN HISTORY, WHICH I'M SURE WAS EQUALLY TRUE FOR MANY OTHER STUDENTS IN OTHER COUNTRIES.

IN MAY, I HAD A CHANCE TO VISIT SOME OF THE PARTICIPATING WORLDLINK SCHOOLS, AND TO TALK WITH MANY OF THE TEACHERS AND STUDENTS WHO WERE PART OF THE PROGRAM. ONE OF THE SCHOOLS I VISITED WAS THE SCHOOL IN LERWICK, IN THE SHETLAND ISLANDS. I WAS SO IMPRESSED WITH THE ACTIVITIES THAT THE HEADMASTER, LES MILHAM, AND THE PARTICIPATING TEACHERS HAD DESIGNED, AND THE WAY THE ACTIVITIES WERE INCLUDED IN THE REGULAR CLASSES, THAT A FEW WEEKS LATER I ARRANGED WITH THE SCOTTISH COUNCIL IN GLASGOW FOR A TELEVISION CREW TO VISIT LERWICK AND INTERVIEW THOSE TEACHERS AND STUDENTS. THE CREW ALSO VISITED THE CROY PRIMARY SCHOOL, NEAR INVERNESS.

I WANT TO SHARE SOME OF THOSE COMMENTS WITH YOU.

HAVE YOU SEEN THE TELEVISION PROGRAM CALLED "DEGRASSI JUNIOR HIGH?" IT'S TELECAST IN MANY OF THE COUNTRIES THAT PARTICIPATED IN WORLDLINK.

IN A CREATIVE FINAL ACTIVITY PROPOSED AND ARRANGED BY ONE OF THE CANADIAN PARTICIPANTS, THE WORLDLINK CONFERENCE ENDED WITH THE CAST OF THAT TELEVISION PROGRAM, WHO ARE ACTUAL STUDENTS IN A JUNIOR HIGH SCHOOL NEAR TORONTO IN CANADA, PARTICIPATING IN THE PROJECT, AND INTRERACTING WITH THEIR COUNTERPARTS AROUND THE WORLD.

IN ORLANDO, ONE OF THE SPEAKERS OBSERVED THAT NO NATION HOLDS A MONOPOLY ON TECHNOLOGY, NOR ON THE USES OF THE TOOLS OF TECHNOLOGY IN THE CLASSROOM.

THE INNOVATIVE STUDENT WORLDLINK AND LEADERSHIP WORLDLINK TELECOMMUNICATIONS FORUMS, CONDUCTED AS A PRELIMINARY TO THE 6TH INTERNATIONAL CONFERENCE ON TECHNOLOGY AND EDUCATION, HAVE COME ABOUT AS A RESULT OF COOPERATIVE EFFORTS OF A NUMBER OF PARTICIPANTS FROM AROUND THE WORLD, AND ARE VERY MUCH IN THE SPIRIT OF INTERNATIONAL EXCHANGE OF IDEAS AND INFORMATION THAT THE CONFERENCE IS INTENDED TO SUPPORT.

CERTAINLY, AS WE APPROACH THE FINAL DECADE OF THIS CENTURY, WE FACE NO GREATER CHALLENGE THAN THE CHALLENGE OF EDUCATION -- THE CHALLENGE TO OFFER IMPROVED OPPORTUNITIES FOR YOUNG PEOPLE AROUND THE WORLD TO BETTER UNDERSTAND AND INTERACT WITH THEIR COMMUNITY, WITH THEIR CULTURE, WITH THEIR ENVIRONMENT, WITH THEIR INTERNATIONAL NEIGHBORS.

THE NEW INFORMATION TECHNOLOGIES OFFER GREAT PROMISE AS A VALUABLE RESOURCE IN MEETING THAT CHALLENGE, BY PROMISING VASTLY IMPROVED OPPORTUNITIES FOR EDUCATION ON AN UNPRECEDENTED SCALE.

AND YET, THE SUCCESSFUL USE OF INFORMATION TECHNOLOGIES IN EFFECTIVELY MEETING EDUCATIONAL NEEDS PRESENTS A CHALLENGE IN ITS OWN RIGHT. EDUCATIONAL LEADERS WHO ARE ENGAGED TODAY ON THIS NEW FRONTIER MUST LEARN FROM, AND BUILD COOPERATIVELY ON, THE SUCCESSFUL EXPERIENCES OF OTHERS IF WE ARE TO PROGRESS IN MEETING THESE CHALLENGES.

MEETING THESE NEEDS, ADDRESSING THESE CHALLENGES, REQUIRES AN IMPROVED LEVEL OF

INTERNATIONAL COOPERATION.

THE WORLDLINK EXPERIMENT HAS ENJOYED AN UNPRECEDENTED SUCCESS IN THIS SECOND YEAR -- AND YET, WE ARE CLEARLY JUST ON THE THRESHOLD WHEN ONE CONSIDERS THE POSSIBILITIES FOR THESE KINDS OF "GLOBAL CLASSROOMS" IN THE YEARS AHEAD.

WE DO PLAN TO REPEAT THE WORLDLINK EXPERIMENT, ON A LARGER SCALE, AND TO INCORPORATE MUCH OF WHAT WE HAVE LEARNED FROM THE TWO PREVIOUS PROGRAMS.

"DESK TOP PUBLISHING" AND "DESK TOP VIDEO" AS INSTRUMENTS IN DEALING WITH THE FLOW OF INFORMATION AND KNOWLEDGE IN SCHOOLS

Zvi A. Halbrecht, Kfar Hayarok, ISRAEL

In view of the "explosion of knowledge and infomation" which teachers and students are increasingly facing, we have to look for up-to-date concepts and tools to cope with the situation.
Visualization of information by computers is considered as one of the best means to handle the problem. We wish to describe the results of our 3 years of experience in applying the DTP and DTV techniqes in schools. Based of the prreliminary results of our experince and in view of the expectation of further developments, we are in the process of building up a computer system which will help us to exploit to the maximum the growing visual cpacity of information techonology.

HADASSIM: in 1986 we started at the Hadssim highschool a program named: Visual Communication. It was first introduced in grade 10 of the school, 3 hours weekly. The course included the following chapters:

1. - Intoduction into visual disciplines of art, design and communication.
2. - Basic design procedures
3. - Practice of production of various printed material (brochures, news papers etc.) using Macintosh 512,ImageWriter ,MacDraw,MacPaint.

For lower grades we organized afternoon courses of graphics with the use of computers.
The next step in our project was Video proudction, using an AMIGA coputer system for various school activities. In order to exploit to full capacity the computer for an in-house video and publishing production, we hired professionals in relevant fields such as: graphic designers, video experts, etc.

KFAR HAYAROK: In septermber 1987 we started to design the computer system of the youth village Kfar Hayarok. This youth village is located in a modern agricultural farm, which is in the process of computerization of its various lines, and the highschool attacched to it puts its emphasis on teaching primarily natural sciences.
Our project in this school centres therefore on the analysis and demonstration of processes in natural sciences, using the farm as its experimental laboratory. For this purpose we established a "simulation laboratory" which contained the following hardware:

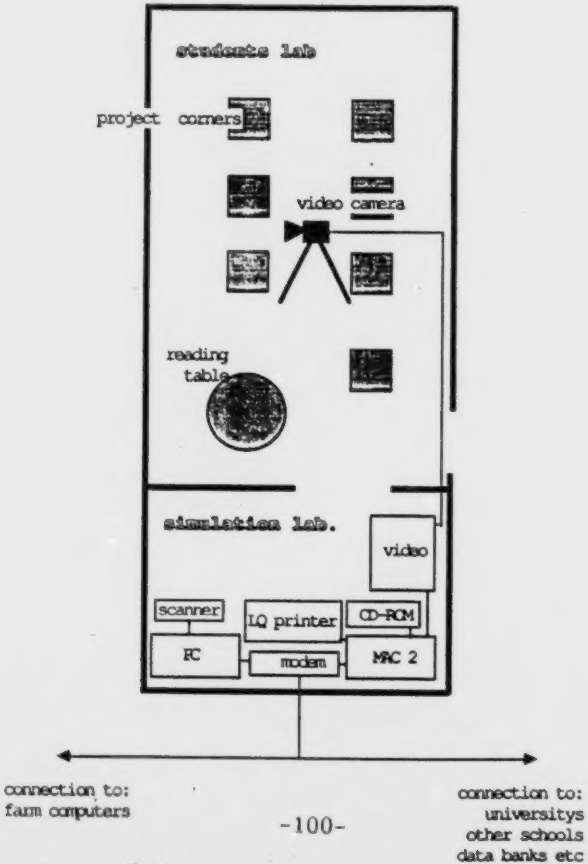
1. Machintosh II with a multiscan screen
2. CD-ROM
3. 3/4" Video Tape Recorder with an interface to a computer and a "search" capability
4. PC Computer with hand scanner
5. LQ printer
6. Modem

In order to facilitate and encourage the use of the simulation facilities by teachers and students we intentionally located the laboratory in the general labortory and closely connected to the stuednt project labortory.

CONCLUSIONS:

On the basis of our 3 year experience we came to the conclusion that there are vast potentials for further development in the use of DTP and DTV in the entire school system, but the maximum exploitation of this technology is conditioned by a basic structural change in the school system:

1. It is suggested to include in the educational program of the entire school system chapters of graphics, design, communication, video production etc.
2. To add to the school staff : designers, experts in graphics, video production and communication.
3. To establish appropriate physical facilitties (laboratories etc.) and to acquire the necassary tools for the production and visualization of the didactic material as above mentioned.


students lab
project corners
video camera
reading table
simulation lab.
video
scanner
LQ printer
CD-ROM
PC
modem
MAC 2
connection to: farm computers
connection to: universitys other schools data banks etc

EVALUATION OF INTER-ACTIVE VIDEO IN TERMS OF EFFECTIVE TEACHING

Nico de Jager, University of Port Elizabeth, South Africa

The educational potential of inter-active video must be assessed within the perspective provided by a consideration of teaching itself as such.

A simplistic interpretation of education is that teaching is nothing more nor less than those activities that a teacher is engaged in. Teacher-like behaviour is thus elevated as a norm and on this basis classroom practices are classified as "good", "average" or "weak".

Although proponents of competency based education do not share so simplistic a view of education, they too are inclined to elevate the behaviour of the teacher to the status of a criterion for assessing the effectiveness and value of his or her instruction (Hall & Jones 1976). By upholding such views of education the behaviour of the teacher is not only seen as an absolute, but it is also assumed (as a point of departure) that the teacher teaches the child and thereby determines the nature of the latter's role in the teaching-learning occurrences.

In terms of this view instruction may be schematised as follows:

TEACHER ⟶ INSTRUCT and LEARN ⟶ CONTENT ⟶ LEARNER

CHARACTERISTICS	PEDAGOGICAL BEHAVIOUR		
° friendliness	° command of subject matter	° content selected by teacher	° passive listener
° fairness	° clear statement of objectives		
° sensitivity	° logical and clear presentation		° minimal involvements
° enthusiasm	° self-confident performance	° frontally presented	
° authoritarian	° encourages student participation		
° democratic	° accepts criticism		
°	°		
°	°		

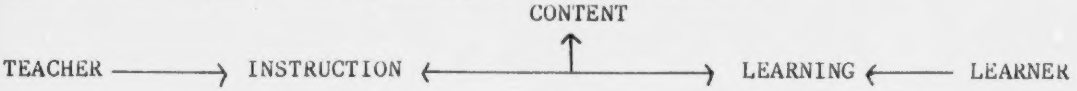
Figure 1.

In terms of the assumption that instruction is reflected by what the teacher does, it is only logical that evaluators should apply certain characteristics and specific forms of pedagogical behaviour by the teachers concerned as evaluation criteria. In such cases where certain behaviour-characteristics of teachers serve as criteria it is accepted that personality characteristics such as friendliness, sensitivity, enthusiasm etc. lead to learning actualization, while opposite ways of behaving impede learning. (Rotter 1954, White & Lippitt 1960).

Similarly, it is accepted that certain pedagogical behaviours of the teacher such as a systematic lesson presentation or clear formulative of aims etc. results in effective learning. In all probability the afore-mentioned behaviour characteristics or pedagogical acts may enhance child-learning, but the extent to which they can make a contribution has not yet been empirically established.

In cases where the conduct of the teacher is applied as criterion in the assessment of learning actualization, a tendency also exists for the effect of the teaching to be measured in terms of the resultant learning outcomes (Popham 1975, Henderson 1965). "In this view teaching is something that occurs when a teacher A, teaches some body of content or set of skills B, to some person or group of persons C." (Johnson et al 1975:) In effect this means that C is evaluated to determine how successful A's teaching was. It is thus assumed that A teaches C and that C's own learning initiative is ignored. A further conclusion that may be drawn is that no learning is possible if teaching has not taken place. Concomitantly, if no learning took place there was no teaching or the instruction provided was defective or ineffectual. Therefore to give instruction equal status to what the teacher does is inacceptable as many aspects of teacher-behaviour do not constitute teaching. Moreover to see teaching as a prerequisite for learning is an equally unacceptable assumption.

Although teacher-instruction should not be scorned or dismissed, the following premise for teaching and learning is more acceptable because it recognises the role of the pupil in the teaching-learning situation:



Effective teaching behaviour in mutual co-operation with the learner to bring about learning-actualization ° actualizes ° interprets ° integrates ° concretises ° evaluates	Mutual interaction between teacher-learner and content in order to bring about effective learning	Effective learning activities in mutual co-operation with the teacher to bring about learning-realization ° attends ° experiments ° conceptualises ° functionalises ° memorises ° reproduces

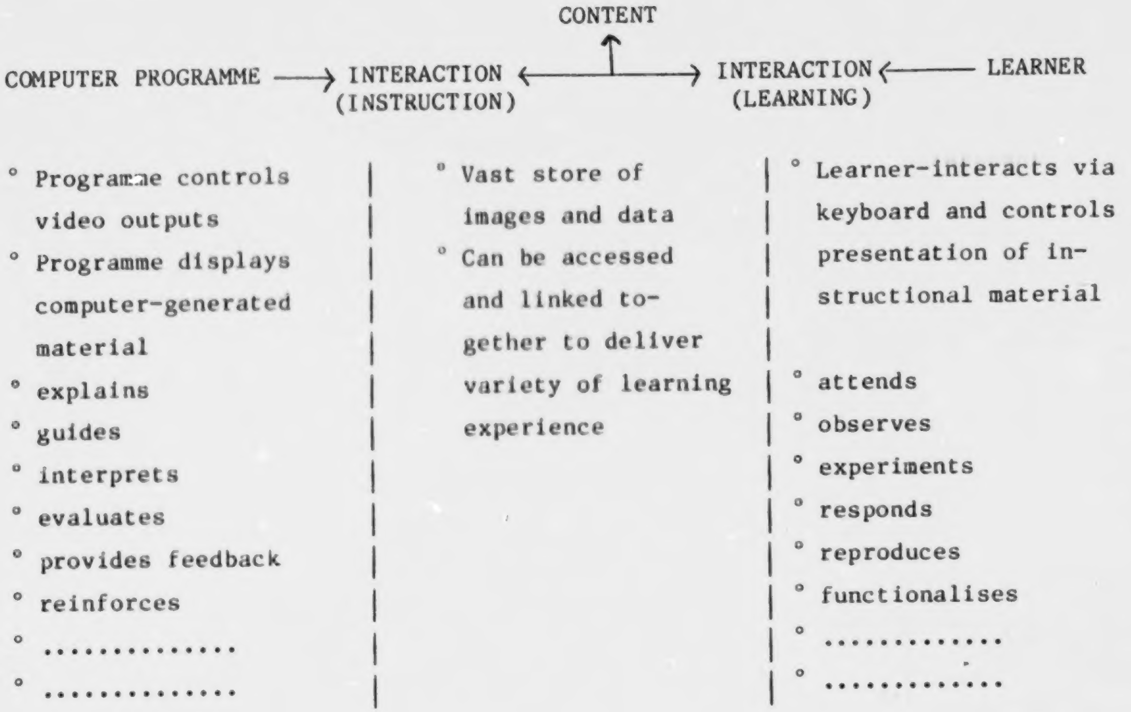
Figure 2.

The major shift provided by this approach is that teaching is not seen as a trick of the trade which somehow constitutes learning, but rather as an integrated negotiation between teacher and learner aimed at learning-actualization for the child. The assumption made is that it is the child who must learn and that instruction must be presented in such a way that the child will want to learn. Johnson (1975:282) also claims that: "The essential matterin teaching is the choosing of what is to be done to engender this coming-to-know, rather than applying a skill or trick of the trade".

Seen in this way instruction per se is thus neither teacher-centred nor child-centred. It is a process which is contextualized/situationalized so as to ensure intensive teacher-pupil participation in the bringing-about of learning.

Interactive video assessed

The teaching procedures operating with the help of interactive video can be schematised as follows:



CONTENT

COMPUTER PROGRAMME ⟶ INTERACTION (INSTRUCTION) ⟵⟶ INTERACTION (LEARNING) ⟵ LEARNER

- ° Programme controls video outputs
- ° Programme displays computer-generated material
- ° explains
- ° guides
- ° interprets
- ° evaluates
- ° provides feedback
- ° reinforces
- ° ....
- ° ....

- ° Vast store of images and data
- ° Can be accessed and linked together to deliver variety of learning experience

- ° Learner-interacts via keyboard and controls presentation of instructional material
- ° attends
- ° observes
- ° experiments
- ° responds
- ° reproduces
- ° functionalises
- ° ....
- ° ....

Figure 3.

Figure 3 shows that teaching/instruction does not merely consist of a number of tried and tested pedagogical actions, nor are the personality characteristics of the teacher of any relevance. The teaching-learning situation consists of a computer programme that presents the learning content but always with the full co-operation and involvement of the learner. The instructional-learning events thus provide for an interactive situation. The quality of this interaction depends on the potential for learning that the programme designer has built into the programme; however, the tempo of the interaction is determined by the learner.

O'Neill (1987:139) in comparing different teaching methodologies comes to the conclusion that interactive video possesses great potential.

	Potential to elicit learner response	Learners degree of control	Degree of ongoing feedback to learner	Promting and guidance
Group lecture	Variable	Low	Low	Variable
One-to-one tutorial	High	Variable	High	High
Non-stop film	Low	Variable	Low	Variable
CBT/Open learning	High	Variable	Variable	Medium to High
Interactive video	High	High	High	Medium to High

Figure 4: Interactive video compared to other teaching media (O'Neill 1987:139

Interactive video cannot supersede ordinary teaching in its totality, but as an instructional medium it has undoubted possibilities. O'Neill (1987:139) asserts

that: "Looking at it from the learner's point of view, it is probably fair to say that, in the majority of learning situations, the learner would prefer to have some control over the teaching medium to receive feedback, guidance and prompts, and to be allowed to comment, respond and interrupt".

Furthermore, interactive video as an audio-visual medium has a huge capacity for information storage and for instant and varied retrieval and presentation.

One disadvantage of interactive video is that the potential value of the medium is dependent on the quality of the programme that has been created. If the planning and design of the programme are poor, the resultant interaction will be below standard while learning processes will remain relatively unsuccessful (Olivier, 1985).

Although the potential for learning through the assistance of interactive video is clear, much more research is still required as regards the design of appropriate programmes (Hannafen, 1985).

REFERENCES

1. Bijlstra, J.P., Jelsma, O.: 1988; Some Thoughts on Interactive Video as a Training Tool for Process Operators. PLET., Vol 25, No 1 Kogan Page Ltd. London.

2. Chambers, J.: 1987; Interactive Video: A genuine or imagined potential. British Journal of Educational Technology No 1, Vol 18. Alden Press Oxford.

3. Feenberg, A.: 1987; Computer conferencing and the Humanities, Instructional Science. Martinus Vrijhoff Publishers, Dordrecht.

4. Hall, J.E., Jones, H.L.: 1976; Competency-based Education: a process for improvement of Education. Prentice Hall Inc. Englewood Cliffs. New Jersey.

5. Johnson, H.C., Rhodes, D.M., Rumery, R.E.: 1975; The assessment of teaching in higher education: a critical retrospect and proposal. Elsevier Scientific Publishing Company, Amsterdam.

6. Mason, R.: 1988; Computer conferencing: a contribution to self-directed learning. British Journal of Educational Technology Vol 19, No 1. Alden Press, Oxford.

7. O'Neill, G.: 1987; Interactive Video as an aid to Learning. PLET. Vol 24, No 2. Kogan Page Ltd. London.

8. Popham, W.J.: 1975; Education evaluation. Prentice Hall Inc. Englewood Cliffs. New Jersey.

9. Rotter, J.B.: 1954; Social learning and Clinical Psychology. Prentice Hall Inc. Englewood Cliffs. London.

10. Sonnekus, M.C.H.: 1975; Onderwyser, les en kind. Universiteit Uitgewers,Stellenbosch.

11. White, R.K., Lippitt, R.: 1960; Autocracy and Democracy: an Experimental Enquiry. New York.

EDUSHARE - A TELECOMMUNICATIONS-BASED SYSTEM FOR EDUCATORS SHARING INFORMATION ABOUT INSTRUCTIONAL USES OF COMPUTERS

Hava Laor, Technion, ISRAEL

ABSTRACT

EduShare addresses the problem of how to enhance communication among educators to help them better prepare their students for an information age. EduShare is a UNIX based expert system (written in C-Prolog) for educators studying through telecommunications at NOVA University, Florida. The system enables online educators to (1) share their experiences and ideas involving computer-applications in education, and (2) locate special interest educators using the same network. The design and implementation of this system are discussed.
It is predicted that computer-based distant education will expand in the near future. Tools to facilitate it will be in great demand. Edushare is such a tool; it is applicable to a whole range of telecommunication systems.

INTRODUCTION

The availability of computerized information demands teachers who can help students learn how to handle information tools such as databases and spreadsheets. A research project carried out by the author (Laor, 86) to evaluate the attitude of educators toward the instructional use of databases and spreadsheets, revealed a need to provide them ideas about specific instructional activities. In an attempt to address this need, a telecommunication based system called EduShare, was developed, by the author, for educators studying through tellecommunications at NOVA University, Florida. These educators are potential leaders in their professional fields. They have the unique advantage of simultaneously studying and practicing what they have learned. This is due to the way by which the graduate program is delivered electronically. Most of the studies take place from a distance, where students use their personal computers and modems to connect to a mainframe computer located on campus.

EduShare encourages efficient communication among educators by providing answers to questions such as:

- o What is known and who knows about a specific type of software, in a specific subject area, for a specific population?
- o Who works in a specific educational field?
- o Who works with a specific population (audience)?
- o Who is using a certain type of software?

First time users on Edushare are asked to enter information about their jobs dealing with computers. Furthermore, they are encouraged to enter information about their use of educational technology and their creative ideas on how to use this technology. The author,

1. designed and developed the system,
2. programmed a prototype of the system in CProlog,
3. built the expert system's initial content-domain of instructional activities using databases and spreadsheets, and
4. evaluated the system by electronic evaluation forms.

BACKGROUND AND SIGNIFICANCE

Many Universities and school districts around the world are turning to distant education through computer-based telecommunications to provide professional training for educators (CLT, 1987; Sharples, 1982; Kaye, 1985; Castro, 1985; Kirman, 1984).

In computer-based distant learning programs, students have access to a whole range of instructional utilities such as tutorials, electronic mail, bulletin boards, conferencing utilities, Electronic Classroom (Scigliano, 1987), Writers Work Bench (including speller and grammar checkers), and more. Students use their wordprocessing software to prepare their assignments offline for transmission online. Printed materials, videotapes, and short lecturer-class meetings are supplementary features of such programs.

Although the interactive telecommunication systems do not replace the personal contact required to make teachers and students comfortable with one another, it can increase the amount of professional contact and thus enrich the students (Stowitschek, 1986: 33). One of the problems of electronic distant education is the lack of "high touch". There is a high potential for communication among learners, but it is not efficient.

Lets look at a common scenario facing an educator today:

> An educator wants to use a new educational software, or technology called X, but does not know how to do it effectively. Being tied up with all the paper work and traditional curriculum demands, an educator tries to get some ideas from magazines and conferences, but this is not enough. Short of time, an educator continues to teach in the traditional way.
>
> Suppose an educator could have access to an online expert system that would tell: who knows, or who might know about X, and what does one know about it? Then, having spent less time on search and being able to read about first-hand experience, an educator might be more willing to try and use X, or look for a better technology. Moreover, an educator will communicate with people who share the same interests.

Computers-in-Education is a new scientific field, still in its infancy. This field can not evolve solely from research laboratories in universities, or from profit-making software houses. This new-born science has to sometimes rely on unpublished work of educators who creatively use computers for training or instruction.

EduShare, the system to solve the problems raised by this project, was implemented as an expert system in order to learn and update itself working interactively and friendly with its users, and in order to acquire expert knowledge from scarce resources.

PROCEDURES

This project followed a systems approach to the development of expert systems (Waterman, 1986) based on the following procedures: Identification, Conceptualization, Formalization, Implementation, Testing, and Revision.

The system was designed to solve problems of information retrieval such as:

o for a given,
software-type (i.e., problem-solving), and/or
subject area (i.e, science), and/or
audience (i.e., high-school):

1. Who might know about it?
2. What information exists in the system about it?
3. When was the above information last updated?
4. Who contributed this information?
5. Who are the users whose past or present personal-information records match the above attributes?

- for a given user-name,
  1. What is his/hers job?
  2. What software-types does he/she use?
  3. What are his/hers subject areas?
  4. Who are his/hers audiences (i.e., high-school)?

The system was designed to:

- assist the user in operating it,
- provide means for updating the system's knowledge-base (e.g., entering information from the keyboard, through an editor, by giving a file name that already contains the information, or directly uploading it from a disk),
- provide means for information retrieval,
- protect information entered by one user from being changed by other users except himself,
- provide a range of text manipulation options (e.g., download text, display text page by page, display text headers, or send text by electronic mail).

The system is a dynamic program that expands itself according to new information received from its users. Users can 'teach' the system new terms that in turn enrich the system's vocabulary and enhance its interaction with future users. For example, if at a given time the system would recognize only the terms 'database' and 'spreadsheet' as software types, it would show them as the only existing options. But, if at any time a user would like to enter information about a new term such as 'word-processing', the system would notify the user that this is a new term and would ask what are its synonyms. When future users would refer to this new term they would be offered all the relevant information existing in the system for this term as well as for all its synonyms.

When the system does not have information on certain specifications it searches for users who are likely to know about this or related topics.

The author implemented the system by constructing a prototype using C-prolog. This prototype was refined and extended during one month. The refinments were done based on feedback received through telecommunication from a pilot group. The system has a built-in evaluation form; each time a user wants to leave the system he/she is asked to fill out this form and to add comments. The evaluation form and the comments are automatically mailed to the author.

DISCUSSION

In this project a telecommunication-bassed expert system called Edushare was designed and implemented. This system enables educators to easily share their ideas and experiences about computer applications. Moreover, the system provides a friendly means to locate special interest educators. The advantages of the system, as implied by the evaluation results, are its ease of use and its user friendliness. These are important features for computer-based distant-education where time online is limited and should be spent wisely. This point is emphasized by Pearson from Deakin University, Australia: "The work of electronic learning students tend not to be the regular hit and miss approach adopted by On-Campus students who have ‘unlimited free use' of computing facilities" (Pearson, 85: 757). The importance of such a tool is in diminishing students' frustrations due to a lack of ‘high touch'; locating common interest colleagues would remove some of these frustrations. Contributions made by Edushare's users reflect a favorable attitude toward the system and towards the idea of sharing experiences.

Every person who tried the program entered information about his job related to the use of computers in education. This information may be updated any time a user comes on the system. A major advantage of Edushare, as stressed by its users, is its ability to remember all past updates related to users' jobs. Thus, whenever someone is looking for users with specific interests, the system will retrieve the name of all users whose jobs in the present or in the past satisfy this search.

Edushare, although designed for educators, can easily be modified to serve any group of people sharing common interests. For example, high-ranking army officers may use such a system to exchange experiences and ideas.

It is hoped that this system will continue to grow in time and be a dynamic resource of useful ideas to enhance the field of computers-in-education.

REFERENCES

Campbell Ann, "Tellecommunications: Communicating Electronically at a Distance", paper presented at the Florida Instructional Computing Conference, Feb. 1987.

Castro Angela S., "An Australian Casebook of Study Centers in Distance Education. Deakin Open Education

Monographs No.1", Deakin University, Victoria (Australia), ERIC ED273250, 1985

CLT Center for Learning Technologies, New York State Education Department, N.Y.,PLANNED DISTANT LEARNING PROJECTS IN NEW YORK STATE, February, 1987.

Gooler, D. THE EDUCATIONAL UTILITY: The Power to Revitalize Education and Society, Educational Technology Publications, New Jersey, 1986.

Kaye, Tony "Computer-Mediated Communication systems for distance education. Report on a study Visit to North America September/October 1985. Project Report CCET/2", Open University., Walton, Bletchley, Bucks (England). Inst. of Educational Technology. ERIC ED732361

Kirman, Josef and Goldberg, Jack,"The Cadet Project: Computer Assisted Distance Education Telecommunication for Post Secondary Education in Alberta", ED246850, June 18, 1984.

Laor, H. AN EXAMINATION OF THE EFFECT OF A DBMS COURSE ON COMPUTER EDUCATORS' ATTITUDES TOWARD THE ROLE OF DBMS IN EDUCATION, practicum, Ed. D. Degree in Computer Education, Nova University, 1986

Scigliano A. John, and Centini A. Barry, and Joslyn L. Donald, "A Real-Time Unix Based Electronic Classroom", A paper to be presented at the IEEE SOUTHEASTCON'87, Tampa, Florida, April, 1987b

Sharples, Mike "Educational Technology and the Open University", TEACHING AT A DISTANCE, p. 15, FALL 1982.

Stowitschek J. Joseph, and Mangus Brent, and Rule Sarah, "Inservice Training Via Telecommunications: Out of the Workshop and Into the Classroom", EDUCATIONAL TECHNOLOGY, p. 28-33, August 1986.

Waterman A. Donald, A GUIDE TO EXPERT SYSTEMS, Addison-Wesley Publishing Company, Inc., 1986.

CONNECTING KIDS: TELECOMMUNICATIONS IN THE SCIENCE CLASSROOM

Cecilia Lenk, Technical Education Research Centers, Inc., U.S.A.

"Scientists have been doing this for five million years, and just think, we're only kids and we can do it."

—Fifth Grade Student

"You can understand better when you have someone else's data along with your own."

—Sixth Grade Student

'The process of kids communicating with each other on their own level has generated more interest and enthusiasm from teachers than any I have seen in a very long time."

—Science Center Director

"My students can't wait for science class!"

—Teacher

"It makes so much sense and seems the only way to truly learn science — my question is, 'What took so long?'"

—School Board Member

These students, teachers, and educators are all responding to what we at the Technical Education Research Centers (TERC) are calling "Network Science". Combining hands-on science activities, microcomputers, and a telecommunications network, TERC is developing exciting and effective programs that empower elementary and secondary school students to solve meaningful problems, enhance teachers' creativity, and are feasible for schools. Our Network Science projects, The National Geographic Kids Network, the TERC Star Schools Project, and LabNet, further TERC's 25-year commitment to using technology creatively to build engaging and equitable learning environments for students and teachers.

The goal of Network Science is to give students the opportunity to actually *do* science— to actually experience for themselves the excitement of scientific research. Too many of our students view science as irrelevant and unconnected to their lives. All too frequently their experience with science consists only of rote memorization of long lists of vocabulary words. Too often, students have little or no opportunity to participate in science activities that are real and important in today's world.

To change this situation, to give teachers and students the opportunity to become active participants in science, we need to dramatically change our approach to science education. To effectively develop an understanding of what science is and how to do science, students need to be engaged by science. The focus must be on meaningful problems, not vocabulary words. Students also need the tools of scientists and, importantly, the preparation, support, and resources to use these tools in the classroom. Our Network Science projects combine hands-on investigations on real-world problems such as acid rain and radon, with computer-based tools and a telecommunications network. Through the NGS Kids Network, the TERC Star Schools Project, and LabNet, students, teachers, and scientists throughout the world are collaborating on meaningful and relevant problems in science.

The National Geographic Kids Network Project

On October 1, 1986, TERC joined the National Science Foundation and the National Geographic Society in a unique partnership to improve inquiry-based science learning for fourth, fifth, and sixth grade students. The National Geographic Kids Network is an exciting series of cooperative experiments in areas of current scientific interest such as acid rain and water quality. Using a telecommunications network, students in the United States, Canada, and abroad send the results of their local experiments to a central computer which pools the data and sends back the combined results. Classes then analyze trends and patterns in the national data, examining how their findings contribute to the overall picture. Through the telecommunications network, students and teachers share their questions and observations with their colleagues, teachers, students, and professional scientists.

One of the key elements in the success of the NGS Kids Network has been the development of very easy-to-use software for the Apple IIGS computer that automates sending and receiving data and electronic mail. To send and receive information from the network, you simply click on the picture of the phone. In addition, the integrated software lets students analyze their own data and data from the network as tables, graphs, or maps.

The NGS Kids Network has grown dramatically, from the original 9 schools in 1985 to over 600 schools at the beginning of 1989. And the NGS Kids Network is international. In addition to U.S. schools, classes from Canada, Japan, Hong Kong, Israel, and Argentina have participated.

The TERC Star Schools Project

The TERC Star Schools Project expands TERC's commitment to using telecommunications to improve science and mathematics education. In October 1988 TERC received a two-year $4.5 million grant from Star Schools Program of the U.S. Department of Education to create a telecommunications-based science and mathematics curriculum for middle and high school students. The central educational strategy of the TERC Star Schools Project is to involve students in cooperative hands-on projects, giving them telecommunications resources to plan their research, obtain expertise, and share results and data with students, scientists, and other mentors worldwide. The project activities are designed to enhance communication skills, introduce technology, broaden student's knowledge in science, mathematics, technology, social studies, geography, and vocational areas. This April we are tested the first five units, Radon, Weather, Polling, Design, and Iteration, in 200 classrooms throughout the United States, including the U.S. Virgin Islands. Over 600 classes in the United States, Japan, and the Soviet Union will participate in Fall 1989. We expect to reach nearly 2,000 classes at the end of the two-year project.

As part of the TERC Star Schools project, we are undertaking a major effort in teacher professional development to enable teachers to effectively incorporate technology and project-based mathematics and science into their classes. With TERC supplying the technical and programmatic leadership, 12 Resource Centers provide extensive teacher training and support through workshops and telecommunications. Our Resource Centers are internationally recognized for their expertise in teacher training:

- Arizona State University,

- Biological Sciences Curriculum Study (BSCS),
- Boston Museum of Science,
- The City College of CUNY,
- MECC,
- Northwest Regional Laboratories,
- Pepperdine University,
- State University of New York (SUNY) at Stony Brook
- Tufts University,
- University of Georgia,
- University of Michigan, and
- University of Virginia.

A national teleconference in September 1989 and a series of videotapes focusing on implementing project-based science and mathematics in the classroom will expand teacher support.

As in all our work, we are committed to making this new approach to science and mathematics available to *all* students, including female, minority, and disabled learners. We are working with the Detroit Public School System, Boston Public School System, New York Community School District #10 (Bronx), Albemarle County (VA) Public School System, Eden Prairie (MN) Public School System, and the U.S. Virgin Islands Department of Education to assure that our materials and approach will be compatible with the needs of all learners.

LabNet

LabNet, a three-year teacher development project funded by the National Science Foundation, expands our innovative Microcomputer-Based Laboratories (MBL) project, a project initially conceived and developed by TERC over the past 10 years. MBL enables students to measure physical phenomena through a series of probes connected to microcomputers. Students collect and analyze real-time data on heat and temperature, motion, force, and sound.

Working with Dickinson College and Tufts University, we are helping physics, physical science, and mathematics teachers use MBL in their classrooms to foster cooperative, hands-on projects. This summer we held workshops at Dickinson and Tufts to prepare 120 teachers. The telecommunications network enables these teachers to have continued discussions with TERC, Dickinson, and Tufts staff as well as to build support networks with each other as they incorporate hands-on science into their classes.

The Importance of Telecommunications in the Science Classroom

TERC's Network Science activities creatively use the capacity of telecommunications to address the problems of science education. Science depends on communication. To do science today requires collaboration with other scientists— sharing data, discussing what these data mean, and collectively generating new ideas and new directions for research. Students learning science have the same need to communicate as professional scientists. Our Network Science projects gives students this ability to communicate. In the three projects described here, telecommunications opens up the classroom. Students learn together with their peers throughout they world. They have access to current information and the ability to do collaborative research. Of course, students within a single classroom can work together, but communicating beyond the walls of the classroom with their colleagues around the world, allows students to participate in a wider-range of science activities, increasing their access to information and greatly expanding their experiences in science.

"NORTH STAR BUBBLE" - GALILEE SCIENCE EDUCATION NETWORK

Uri Marchaim, MIGAL, ISRAEL

ABSTRACT

The "North Star" education project was independently conceived to serve educational and social needs in Galilee, but its potential for wider application has always been clear. Its special contribution to establishing a regional Network lies in its ability to concentrate on the field of Life Sciences while at the same time employing the techniques of education through a computer network.

Our project is based on two main premises: the network and the "Bubble" experiment. The latter consists of a miniature eco-system in the school, in which the experimental conditions are fully controlled through a computer. Each school would work on one or more "Bubble". The former links the schools together, so that all data are instantly interchangable.

The setting up of a computer network between the regional schools, linked to MIGAL and through MIGAL to world-wide databanks will provide students with the following advantages: a. It will increase the number of students that can be involved. b. Programmes can be constantly upgraded or converted to more sophisticated ones. c. Data can be constantly reviewed and corrected or updated. d. Experiments can be performed in multiple replicates. e. Reliable backing-up is more easily achieved. f. Central advisors by MIGAL researchers would contribute to the scientific level, improve order and maintain standards. g. There would be better supervision of the students' progress. h. The improvement of communication between teachers on the one hand and between students on the other by means of "regional experiment" and "electronic mail" would be of great value for the rural region of Upper Galilee.

OBJECTIVES

The aims of the "North Star" project are the raising of teaching levels in local schools, the enrichment of science education in those schools, beyond the potential of the regular curriculum and of the means available to individual schools, and the fostering of a sense of regional community. The integration of the schools in a computer network, linked to the MIGAL Technological Centre and to world-wide databanks, will create a unit of high educational potential. With MIGAL supplying researchers at a scientific level not usually available in high schools, and with a degree of immediacy of communication that goes well beyond the seminars and refresher courses available to teachers in the present framework, the goal of advancing science education in high schools can be achieved.

The use of a regional Network came as a need and an equipment to fulfill the need of the science programme. The special contribution to the education programme of establishing a regional scientific Network, in which "Bubbles" are connected, lies in its ability to concentrate on experiments in the field of Life Sciences done in several schools simultaneously while at the same time employing the techniques of education through a computer network.

INTRODUCTION

The "North Star" programme was established to provide an opportunity for talented youngsters in the Upper Galilee region to develop their potential in the Life Sciences. The aim of the scheme is to motivate these youngsters to continue their studies in the field and, on graduating, to return to Upper Galilee to make their homes here.

The gifted students of grades 10-12 will be involved in biological research which includes computers, controls and experiment, in an advanced and integrated programme. This biotechnological work will encourage them and equip them for further studies in biotechnology.

This "Bubble-Network" programme has never been tried anywhere in the world and if it proves a success may well lead development in other parts of the world. In its first stage, in Upper Galilee, it will certainly create a sense of community among the teachers in isolated schools. It will also encourage students to understand and explore the potentialities of the computer, in local link-ups and in its international aspect, which will aid them greatly in their future work in industry.

Our project is based on two main premises: the network and the "bubble" experiment. The latter (Fig. 1) consists of a miniature eco-system in the school, in which the experimental conditions (light, spraying or irrigation, carbon dioxide concentration, conductivity of water, heating or cooling etc.) are fully controlled through a computer. Sensors collect the data and transfer them through the controller to a computer where they can be analyzed. The pioneer "Bubble" of a photosynthesis system for seaweeds has already worked for a few months and was programmed and analysed by four talented students. Each school would then work on one or more "Bubble", while data are instantly interchangable through the network.

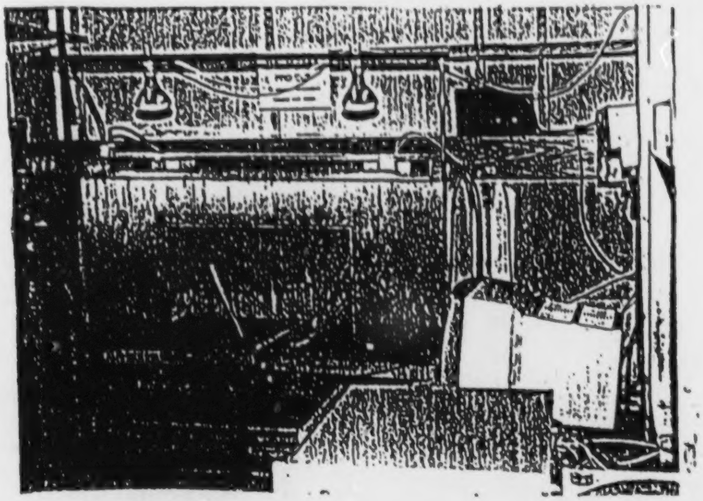


Fig. 1: The "Bubble" for photosynthesis experiments

The setting up of a computer network between the regional schools, linked to MIGAL and through MIGAL to world-wide databanks (Fig. 2) will provide students with the following advantages:

1. a. It will increase the number of students that can be involved. This includes talented as well as regular students who will enjoy the use of sophisticated modern equipment.

   b. A unified network is more easily handled than a large number of independent PCs, working on varied programmes.

   c. Programmes can be constantly upgraded or converted to more sophisticated ones. In the case of a scheme that depends so much on on new developments and has to work simultaneously in 12 schools, this is crucial.

   d. Data can be constantly reviewed and corrected or updated. The potential ability of researchers from MIGAL to penetrate into the system and to solve problems on site may be of great importance.

   e. Experiments can be performed in multiple replicates and in several controlled and coordinated conditions in different schools. This will enable teachers to teach a subject at one "Bubble" station, while students receive results from other stations which are working with other conditions. The analysis of results will be the important topic.

   f. Reliable backing-up is more easily achieved.

   g. Each student would have his own code, maintaining his "secrecy" when required and guarding his experiments from interference.

   h. Results would be speeded up by faster control reaction.

   i. Central advisors would improve order and maintain standards.

   j. There would be better supervision of the individual student's progress.

   l. The improvement of communication between teachers by means of "electronic mail" would be of great value.

k. The improvement of communication between students by means of doing joint experiments and comunicating by "electronic mail" would be of great value, especially in isolated and remote schools.

2. Setting up a network would enable us to create a "computer farm", linking a number of biological work stations that would be able to collate from a number of sources, adding a dimension to the work of the class. The classwork would be based much more on experiments and control systems. The sharing of data and results of "bubble" experiments between schools, while each school performs the same experiment with one or more variables, with the professional help of MIGAL, would give each class experimental data far beyond its individual resources and the limited time available to study a subject, enabling the class to go beyond the scope of a partial experiment, to learn methodology in the collation and presentation of material, and how to reach and present conclusions and summaries. Teachers would benefit similarly from the exchange of information and experience, in particular in outlying schools.

3. The network will facilitate participation by a great number of pupils at different experimental levels. Our intention is to begin with gifted students, encouraging them to devise further experiments.

4. The network would be a cheap and effcient means for teachers and students alike to access to outside information on their topics. Suggestions for experiments could come from researchers in MIGAL and the rest of the country, specially conceived for schools. Though initially guidance would be given by the centre, the aim is to involve the teachers and the pupils who are in the network, as well as the researchers at MIGAL.

5. Teacher consultation would be an important element in the network, in both senses: providing information and exchanging ideas.

6. Access to databanks in the biological and biotechnological sciences would be possible, and in addition, there would be an ever-increasing pool of information gathered and stored by MIGAL. We will encourage students to build up our own Biological database in Hebrew which will include their results of 'matriculation' projects, 'Ecologic Biotop' projects and summaries of scientific papers read by the students.

7. Students would collect and publish their results within the network, while scientists in MIGAL would check them and add their comments and suggestions. In several schools, where sophisticated controlled greenhouses exist, the Network will help in transferring data and even in some cases in controlling the operation.

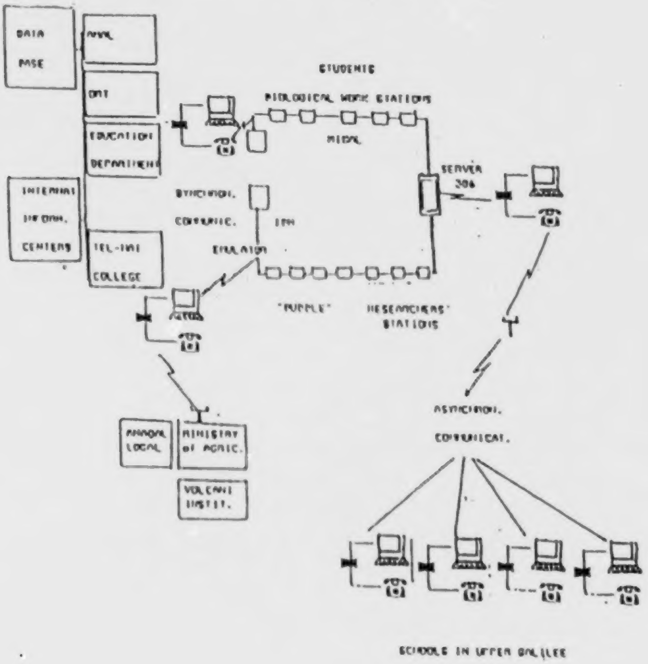

DATA
BASE
ORT
EDUCATION
DEPARTMENT
INTERNAT
INFORM.
CENTERS
TEL-HAI
COLLEGE
STUDENTS
BIOLOGICAL WORK STATIONS
MIGAL
SERVER
386
SYNCHRON.
COMMUNIC.
EMULATION
IBM
RESEARCHERS'
STATIONS
ASYNCHRON.
COMMUNICAT.
MINISTRY
OF AGRIC.
VOLCANI
INSTIT.
SCHOOLS IN UPPER GALILEE

Fig 2: The setting up of a computer network between the regional schools, linked to MIGAL and through MIGAL to world-wide databanks.

THE GLOBAL EDUCATION MODEL (GEM) AND THE NEW YORK STATE US/SOVIET SCHOOL PROGRAM

Chris Morton, Charles Mojkowski, Mark Roland, Peter Copen, U.S.A.

The Collaborative Enterprise

The processes of educational telecommunications and the programs described in this paper are part of a collaborative enterprise between the public and private sector. Much of what has been implemented and what is part of the expanding vision is the result of input from many individuals. However, the primary collaborators are, the Copen Family Foundation Inc. whose work has both stimulated the programs and funded them, the Putnam/N.Westchester Board of Cooperative Educational Services which provided administrative support, training personnel, and the Global Educational Model (G.E.M.) comprised of eighteen school districts as a research and proving ground for international programs and telecommunications, and the New York State Education Department which provided some personnel, advice, and links to schools which teach Russian in New York State for the New York State/Moscow Schools' Telecommunications Project.

The Vision

Arthur C. Clarke's vision of a world linked by telecommunications is now all but a reality. Our vision accords with his, but with one subtle difference; we are educators and we believe that educational telecommunications provides one of the final hopes for global cooperation that will save this planet and provide a stable future for our children. In 1985, investigating ways to link students in the classroom to experts in the greater society, we sat down with a representative from MCI. At the time the systems offered were not appealing - they were difficult to use, expensive, and could not be linked to the kind of people we wanted students to be able to talk to. But this initial move lit a spark which has given birth to the Global Education Model and the Copen Family Foundation's international initiatives, the most advanced of which is the New York/Moscow Schools' Telecommunications Project.

Our joint educational telecommunications vision focuses on the use of various media to change and expand educational practice from didactic, classroom-based instruction to problem-solving-based, student generated learning in open classrooms across the world. The teacher is an integral part of the process but the role of the teacher has changed from information giver to information guide, as described by Frances Klein (43: 1989):

> *'....it must be asked whether the role of conveyor of information is even an acceptable or desirable one for your teachers, given the fact that our society finds itself in a revolution. It is very possible that the computer will perform this role better than the human teacher in the future, making available to students a very broad array of content whenever they need it. This will free up teachers to perform more intellectually complex and less mechanical roles than those associated with the conveyors of facts and details. The information society into which we are moving is forcing us to create new and more vital roles for teachers, as computers become more common in and important to the education of our students.'*

Telecommunications allows both student and teacher to work well beyond the four limiting walls of the standard classroom: it opens up the world of continuous, easy, and needed collaboration, and it allows educators to expand the process of instruction through shared planning, shared data, shared information interpretation, and shared information development. The telecommunications process functions at a local level between classrooms and schools, at a national level between schools and districts, and at an international level between peoples and cultures. The flexibility of the telecommunications media and their processes in education are still being investigated but their major attribute is that they allow for true child-centered approaches in developmental educational techniques without the intervention of bureaucratic controls or teacher-centered instruction which results in knowledge loss; " *...the teacher continues to be the primary source of learning, augmented largely by a textbook in most subject areas, with some supplementary materials used occasionally. As a result, many areas of potential knowledge are never introduced to students. Eisner (1985) refers to this gap as the 'null curriculum' - knowledge that never gets offered to students.*" (Klein 1989: 120). The questions asked by students and the answers they receive when telecommunicating with their peers and with experts now available to them lead them towards a world of learning as varied as their creativity allows and as complex as the proliferation of information makes it.

However, telecommunications alone does little to enhance learning. Results of our work to date are very clear on this. International telecommunications as grandiose pen-pal process is not a part of our plan. Examples of programs of this kind show early disillusionment, halfhearted participation and eventual collapse; students' interest in their foreign peers' habits quickly wane. Educational telecommunications without structure and without instructional relevance in the operational learning milieux lose teacher and administrator support and quickly dissipate and disappear. Structured, planned, and carefully designed programs with local participation in the development process are crucial to success where success is measured by learning gains and by expanded global cooperation.

But our vision goes one step further; we believe that students must be given the opportunity to make a difference in their world (whether that world be in the local school, the community, the country, or on the globe) and must be encouraged to first expand their own vision in their suggested design of online programs in collaboration with their peers in other countries. Secondly, when designing programs, students and teachers must focus on the outcomes of such programs and ask themselves whether these outcomes do include making a difference and how this difference is achieved. Standard didactic, content-based educational telecommunications applications of the kind now proliferating through commercial enterprise are unacceptable to change-agents in education. Like most general educational computer software this type of commercial program reinforces old didactic paradigms and should be used with circumspection.

The Programs: The Global Education Model (GEM)

Based on a regional agreement with eighteen school superintendents the Global Education Model (GEM) in Westchester County, New York, was born in October 1988. This model is the "flagship" for the development of twelve international educational telecommunications centers in the United States under the aegis of expanding planning of the Copen Family Foundation Inc. The intention is that these centers will be linked into a national organization using New York City's *NYCENET* with a gateway to IGC's *PeaceNet* and *SFMT* for international telecommunications.

The first year of GEM's existence has been focused on the piloting of a number of nationally recognized telecommunications programs to investigate the educational applications of telecommunications in the classroom environment. Programs piloted include National Geographic Society's *KidsNet*, AT&T's *ClassMates*, University of Maryland's *ICONS*, and WorldLink's *World Citizen Curriculum*. The GEM telecommunications investigations also included the establishment of a local E-Mail system called the PutWest BBS for teacher and administrator use which will be expanded in the Fall of 1989 to include a separate BBS for students. The region is also directly involved in the New York/Moscow Schools' Telecommunications Project, a collaborative three-year formally evaluated program (using the New York State Validation Procedure) initiated by the Copen Family Foundation Inc, in an agreement with the Soviet Academy of Sciences.

The initial findings from this work reinforce the necessity for structured educational applications. Programs such as KidsNet (emulated at secondary school level, in part, by GTE's *SciNet* programs) have shown that the application of the scientific research process, online, where students collect data from real situations, share the data with peers in other regions in structured formats [e.g., maps and matrices], and are able to discuss interpretations of this data, develops an expanded and highly motivated instructional model in classrooms and leads to unplanned, socially important responses by students to the interpreted data (information).

Online complex simulations of the kind developed by the University of Maryland in their *ICONS* program reinforce the need for structure and defined learning outcomes but expand the concept of sharing. In all cases schools found that students became highly motivated in the learning milieu because of their ability to share and discuss concepts with their peers and because of the application of simulation designs taken from "real" situations which have a direct impact on the lives of the students. A side effect of both the scientific research programs and the political science simulations was the direct involvement of the community through the expanding and pervasive enthusiasm of the students but also because of the need to obtain information in the community not readily available in the school.

The roles of teachers changed in the application of these programs and others like them. Initially teachers felt discomfort and even antipathy towards these changes with comments like, *"I don't feel that I'm doing anything in the classroom while the children are involved in the program, and I feel guilty in this position"* (Anonymous 1989). However, after analyzing the situation and understanding the expansion of prior pre-instruction roles in planning and training, teachers began expanding their in-classroom foci to provide structures for student support in the online activities and the backup activities required to maximize the use of online time. In an aside to this some reference to the supervisory roles of US schools' administrators is necessary. In our work it has become clear that many teacher's supervisors do not understand the changing role of the teacher in the applied classroom use of telecommunications (and, indeed, all computer-use) and are often unable to fairly align their usual evaluation criteria, which are based on didactic models, with their observation of teachers and students online.

The programs that are a part of the GEM research process (e.g., KidsNet, ICONS) and results described are what we have termed "formal programs." They form one part of a two-part program development process in our work. The other part is known as "informal programs". The "informal programs" have found their greatest development at this time in work done in the New York/Moscow Schools' Telecommunications Project and using experience gained from the "formal programs". In designing the criteria for "informal" program development project developers insisted on three distinct criteria: (i) that the programs must be student generated, (ii) that teachers must play a support role, (iii) that the projects must make a difference.

The New York State/Moscow Schools' Telecommunications Project

The US/Soviet educational telecommunications link was established in November 1988 and thirteen schools on each side of the Atlantic participate in the program at various levels in sister-school relationships. For the first six months the program initiated what was called a *"hello"* period where students, teachers and administrators were encouraged to get to know each other and to begin discussing the types of collaborative programs they would like to work on. Two modes of telecommunications are made available to all schools: computer-based telecommunications using the San Francisco/Moscow Teleport (SFMT), and still-scan video conference telephones developed by Mitsubishi called LumaPhones.

In June/July 1989, 29 teachers from the United States (most of them from New York, but with colleagues from California) and seven program developers went to Moscow for two weeks to participate in training with 29 Soviet teachers (most of them from Moscow, but with colleagues from Troitsk and Leningrad). The major focus of this training was to allow the teachers to get involved in collaborative planning with their counterparts and to design at least two prototype programs each based on student ideas which would be implemented in the 1989/90 school year. The results of this international teachers' meeting indicate that teacher involvement of this kind in the expansion and implementation of international educational telecommunications projects is crucial to their success.

Unexpected and complex situations arose based on cultural and social differences; a poor understanding of cooperative project design, group work, and application capabilities and instructional modalities were among these difficult situations. This phenomenon was articulated in a research paper presented at the conference by J. Yakovenko (2: 1989):

> *"Human experience shows that a dialog between two or more unacquainted or not-so-well-acquainted people is never easy. It is not often that such a dialog develops at all. But if there is a vital necessity to communicate the culture establishes several forms of ritual quasi-communication, or communication due to individuals' positions - that is, a polite exchange of replies and small talk which are substitutes for essential communication. Ritual communication is aimed at changing or confirming social status, at the psychological adaptation of participants, and at the re-affirmation of emotional contact. It is obvious that we are interested in essential communication (in this project)."*

No attention is given to this cultural/social quasi-communications/essential communications phenomenon in extant educational telecommunications programs. In fact there is little attention paid to it in international communications research at all (Brownlee 1988). Our work indicates that it is of prime importance if meaningful international telecommunications program development, expansion and use are to proliferate. It has become clear, therfore, that involvement between countries requires high sensitivity to those that are beginning to explore educational telecommunications. Breakdowns occur at the most superficial levels because groups refuse to admit to problems. Face-saving provides a breeding ground for goal displacement. Also, groups insist on planning and design involvement even when they do not have the skills to be full participants without extra training. The use of "predesigned" curriculum-based programs in schools will also not work - ownership must be a part of the process, but the major problem is basic understanding about procedures and outcomes - those things that are readily accepted and understood in our own society may form major obstacles to development in other places. Dealing with these kinds of situations online is almost impossible - the electronic, text-based nature of the communications process can be used to obscure a multitude of problems. Our teachers discovered this in their face-to-face work together; in many cases the program negotiations process had dragged on for months, but when teachers got together they were able to work out the differences.

The New York/Moscow Schools' Telecommunications Project has now a series of joint projects designed to start this Fall. They include complex programs involving the analysis of economic relationships between the USSR and the US which will provide information and advice for business entrepreneurs working on joint ventures; DNA research; analyses of world deforestation and the development of humanitarian laws by students, collaboratively, to be presented in 1990 at the World Court in the Hague and to the United Nations General Assembly in New York; the analysis of national heroes and a comparison of their characteristics; the development of cooperative newspapers; the application of literary criticism to selected works by both Soviets and Americans; the analysis of global climatic patterns; and several science-and-math-based programs involving polling, iteration, and problem-solving designs. The wide gamut of these selected programs gives some indication of the interests of the children involved and the cooperative involvement of their teachers. The conscious variety of programs also emphasizes, however, the experimental and exploratory nature of the use of telecommunications in the many applications processes in different classrooms. The teachers and their support personnel will be severely challenged in the implementation and follow-through processes but, as stated again by J. Yakovenko (1: 1989):

> *'If we speak about the ideas behind the project (NY/Moscow Schools' Telecommunications Project) it can be referred to as a package of programs that initiate the world community to the XXI century. I believe that we do not yet fully realize the potential of this movement at this time. The destiny of the project is hardly predictable. It may be successful or not, but its crucial focus - that is the use of modern technology and the resulting direct contact of common people in different countries - will have a decisive influence on the changing consciousness, cultures and continents in the coming decades. This new communications entity will determine the nature of the world culture and world unity.'*

Growth Initiatives Under Way : the Global Education Model and the Copen Family Foundation

The Global Education Model (GEM) is a consciously developed, regionally limited example of a telecommunications-based educational milieu. Future expansion depends, as does most of this work, on our ability to encourage private and government organizations to participate by expanding their own visions and to putting money to work for the development and change of current educational practice, including school improvement through technology-based curriculum planning and design. The expanded funding and development focus is being targeted with the hope that the GEM model, through its research and action, can help improve the work of other centers like it.

The expansion of the goals of the Copen Family Foundation includes linking U.S. schools to Argentina, Mexico, Brazil, Israel, the European Community, Kenya, Zimbabwe, South Africa, China and Indonesia. This process, like the process used in linking New York State Schools with Soviet Schools, takes a great deal of diplomacy, time, energy, and negotiations skill. Unfortunately, some government-level administrators are not comfortable with telecommunications. Finally, and often most importantly, the technological networks are not yet fully mature, and so we must also spend time negotiating for telecommunications access and often designing that access in different world regions.

Our active work includes potential collaboration with The International Foundation for the Survival and Development of Humanity and IGC. At this time we have fairly easy electronic access to about seventy countries in the world. However, this number is misleading because it includes most of the European Continent, some parts of Asia such as Japan, and other developed countries like Israel, Australia and New Zealand; it does not include some of the countries which, we believe, are central to our expanding educational vision - Third World and developing countries in particular. To this end we are working to help establish telecommunications hosts in Moscow, in China, and in Kenya which will allow easier and cheaper telecommunications access to these countries and those countries around them. The technological problems do not end with easy regional host access, however, because in many regions in many countries telephone systems are archaic or non-existent, and this means no access at all. To expedite access to these regions we are working to establish an educational low-level satellite system whose users will have a packet radio network at their command.

Other local and regional initiatives in the United States include the linking of native American schools (in Oklahoma and North Carolina) to GEM and the development of experimental programs looking at the transmission of graphics, video, and sound on standard telecommunications systems. Many of our inner city schools are comprised of disenfranchised minorities. Another of our projects is linking these children to their countries of origin to build self-esteem and responsibility.

Objectives For Expansion

The Copen Family Foundation Inc. initiative has five developmental steps in this current year: (i) the consolidation of a national network using NYCENET as the hub - this involves twelve schools' centers across the country including the Global Education Model (GEM). Each of these centers will be independent and autonomous but each of them need to agree to participate and share in the national network, as well as agree to the educational philosophy previously articulated in this paper, (ii) the consolidation of agreements between the US and other countries to allow expanded school linking, (iii) the development of comprehensive training applications in published form including options for expanded program design and development, (iv) the expansion of the technological capabilities of countries and the US to be able to expand the international education telecommunications network without hindrance, and (v) contributing to the research on educational practice and telecommunications use to encourage other research-based items not now fully understood.

This work - a collaboration between public and private organizations - will, if successful, help create a new paradigm of what is possible for technology integrated into the educational process and committed to international understanding and cooperation for the twenty-first century.

Information Access

A major problem in the future use of international telecommunications in education is the lack of information access by children from technologically undeveloped countries. In some countries this problem is designed to reinforce political aspirations. In many countries, however, it is the lack of resources and planning which has resulted in an information deficit. In the future online systems which are being used for educational purposes must supply not only easy access to information across the globe to provide the full framework for research-based problem-solving models of education, but also to provide equity of information access for students and teachers. Problems with information access also include language difficulties, and the transmission, transliteration, and translation of different languages, especially those not based on the English alphabet. These are information difficulties that the technological community must face in the near future.

The programs that we are building are attempting to come to grips with the information access problems in their design and piloting of research models whose major outcomes are to analyze the access to and the use of information in educational telecommunications processes. To this end, the Global Education Model (GEM) will be collaborating with Dialog Inc. in the coming school year to run a national U.S. pilot analyzing information-use in specific research programs where that information is derived solely from electronic sources. Dialog has suggested, too, that it would be willing to help in international information access through the linking of CD-Rom systems to hosts in foreign countries. We are also developing an online expert access (or mentor) system with IGC using BitNet for students to be able to pose questions to university or other institutions' experts about their projects and to have further access through full-text searches to comprehensive online conferences on world problems. Easy, inexpensive, regular database access, online, is necessary for all educational expansion in the next 10 years - this must be the primary educational-use focus of all formal telecommunications systems, local, regional, national, and international.

References

1. Anonymous (1989): A quoted statement from a teacher using telecommunications in the classroom.
2. Brownlee, Bonnie J. (1988): *Conducting Evaluation Research Abroad: Some Things They Don't Exactly Tell You, Association For Education in Journalism and Mass Communication,* Portland, Oregon.
3. M. Frances Klein (1989): *Curriculum Reform In The Elementary School: Creating Your Own Agenda,* Teachers College, Columbia University, NY.
4. J. Yakovenko (1989): *Dialogue Of Cultures In The School Electronic Mail Project,* an unpublished paper presented at the New York/Moscow Schools' Telcommunications Project Conference in Moscow, June 1989 (Translated from the Russian).

THE PLUTO INTERNATIONAL NETWORKING PROJECT

Norman Longworth, IBM International Education Center, BELGIUM

PROJECT DESCRIPTION

SUMMARY

The PLUTO International Network Project uses modern tele-communications technology to establish an **Educational Infrastructure for European Teacher Training Institutions.** It presently links together teacher educators, classes of students training to be teachers and teachers undergoing further professional training in ten European countries. It aims, in the longer term, to create a robust pan-European electronic network for many activities related to teacher education at all levels and in all countries of Europe.

Through an approach which can be called *'collaborative distance learning'*, the Project introduces into this key sector new perspectives based on the technology-rich environment confronting education systems as they approach the twenty-first century. It represents also a major commitment to the development of an international dimension into teacher education in the context of classroom work in many types of educational environment.

PROJECT BACKGROUND

The PLUTO Project arose from several discussions about the motivational impact of electronic networks on education between the authors of this paper in 1985. It was eventually proposed by, and is presently directed from, the Centre for Information Technology in Education of Manchester Polytechnic, supported initially by IBM Europe and now by several European Companies. The Manchester Centre has a long-established expertise in the educational uses of new information and communication technologies (NICT) and also of working at an international level.

The first phase of the project draws also upon the expertise of a European group of university-level teacher educators, all of whom have a responsibility for the introduction of NICT into teacher education. Most members of this group have worked together over many years and have extensive experience of development and consultancy work at European level, in North America and elsewhere. It seems a natural starting point for the development of a pan-European electronic network for Teacher Educators, though already the group has been extended through new contacts and new needs.

The Manchester node is the co-ordinating node for the network and provides Project management and development strategies. At the present stage of development, there is a single, very active, node in each of the participating countries. This will be the development network for the early stages, though it is intended to build this up to a full European PLUTO open-access, self-funding network infrastructure by 1992.

EDUCATIONAL GOALS

The PLUTO Project has ***three overall educational goals.***

- *The first is to introduce into teacher training, skills in the use of information and communication technologies which, we may confidently expect, will be commonplace by the end of the century.*
- *The second, and ultimately the more important, goal is that of identifying those new forms of classroom activity, and changes in the learning environment, which are brought about by the use of the NICT.*

- ***The third is to establish practical collaborative projects which practise these activities and to disseminate the results of these into the wider teacher training environment through a widening of their participation in the network***

Thus the Project builds firmly upon work already undertaken in the participating nodes in the fields of, for example, database use for information processing, and wordprocessing for language skills. Where it goes beyond such previous work is in its use of the communications facility of the NICT.

The central concept of the PLUTO Project has been identified as *'collaborative distance learning'*. That is to say, the project explores the new modalities of learning that become possible when educators who are geographically - and sometimes culturally - remote from each other are enabled to work together on shared projects and to become *resources for each other.* ***This approach has the dual advantage of developing their understanding of the technologies and their inter-national perspectives at the same time and in a practical way by the use of the technology itself. In this way it creates an awareness of, and a respect for, the cultural diversity which is part of Europe's educational heritage.***

PLUTO's management style devolves the ownership of its projects to the nodes themselves. Each participating institution is expected to run and manage at least one major activity or project and to take part in four additional ones run by other nodes. Many will take charge of more than one activity. In this way the central group co-ordinates and manages rather than imposes, and the flexibility of a wide range of projects which are of real interest to the regional organisations is emphasised. The results are made available to the whole network, and these should be in the form of deliverable items such as teaching materials and databases.

PARTICIPATION in PLUTO

Institutions currently participating in PLUTO include:

- *Manchester Polytechnic, UK*
- *The University of Falun/Borlange, **Sweden***
- *Zahle Seminarium and the Royal Danish College, **Denmark***
- *The University of Braga, **Portugal***
- *The University of Oldenburg, **West Germany***
- *The University of Vienna, **Austria***
- *The Free University of Brussels, **Belgium***
- *The Institute for Science Management and Informatics, **Hungary***
- *The Hogeschool Midden Nederland, **Netherlands***
- *Universite Paris Nord and Ecole Normale St Denis, **France***
- *UNESCO, **France***
- *The University of Patras, **Greece***
- *The Programa d'Informatica Educativa and University of Barcelona, **Spain***
- *The University of Reykjavik, **Iceland,***

It is anticipated that ***Italian and Swiss*** Institutions will join in September 1989, organisations in Bulgaria, USSR and Turkey are eager to join, and non-European cultural dimensions from the Naruto Teachers College, ***Japan*** and Institutions in Israel, Egypt and Africa may also be possible in 1989. These are the pioneers in an ever-expanding network of Teacher Training Institutions, Schools and perhaps also Industrial Training Establishments throughout Europe.

PLUTO SUPPORT

The PLUTO Project has attracted a high level of interest and this, in turn, is attracting a wide level of support. The *Central Administration* of PLUTO has, at its beginning, been funded by IBM

Europe and active financial support for *local* project development has come from IBM Denmark, the Swedish, Spanish, Dutch and French Governments and IBM UK. An important grant has been awarded by the ERASMUS Programmme of the Commission of the European Community.

The process of widening that industrial and governmental support base has already begun at both central and local levels. I.R.I of Italy are already contributing and 12 other large European industrial companies, most of them household names, will join the Steering Committee at its next meeting to help the under-pinning of the central coordination function of PLUTO. The indications are promising that support from DGV of the European Commission will follow rapidly, since the concept of PLUTO is very strongly within its future plans in this area.

Since PLUTO initiates and operates its individual activities and projects from the national nodes, the question of local sponsorship arises. Local PLUTO centres are already negotiating with National Governments and Industry to provide resource into their own parts of the PLUTO operation.

The intention is that ***the project should become self-financing by the early 1990s.*** It is calculated that a relatively modest fee per participating institution, or a combined fee for the teacher education institutions in any one country, would enable PLUTO to provide an on-going facility which would greatly enhance the resources available to teacher education.

FUTURE EXTENSIONS

The potential for further development is high. In terms of international co-operation and understanding, the project management sees extension to a greater number of the countries of Eastern Europe as a viable target. Because electronic communication makes collaboration a practical and immediate reality, PLUTO offers the possibility of involving educators from all countries in the experience of co-operation across political frontiers.

Equally, there is a high potential in respect of co-operation with the developing world. Although the Project as initiated has been European in context, the goal of establishing joint projects between teachers and teacher trainers in Europe and others in the developing world has been identified from the outset as a firm plan and UNESCO is certainly keen to help this process.

Essentially, what the PLUTO Project is bringing into being is the possibility of a global community of present and future teachers and their educators working together and learning from one another, while at the same time developing the technological skills they will need in the schools of the future. This objective is not just an idealistic educational dream - it is in the direct interest of Industry, of Government and of the Institutions which participate. The Project team believes firmly that its work is pointing to the kind of educational collaboration which will be the model for the educational systems of the future.

Already a number of schools, in two countries, are involved, and it is planned that more schools will participate in the near future, since they represent an essential component of the extended PLUTO node.

COSTS

Experience so far indicates that the costs of participation in the PLUTO Project are not prohibitive.

Any participating institution needs, clearly, one or more appropriate microcomputers - a minimum of five is recommended; the project is not specific to any one make of hardware. A modem for telephone connection is clearly indispensible, as is suitable software, especially database and communications software.

Secondly, it is highly desirable to ensure that at least one teacher-tutor is able to devote up to fifty percent of a timetable to managing the Project in any participating institution. This input of personal commitment and time is surely the key to successful participation.

Finally, there are the costs of using the network carrier. At present, the EARN - BITNET - JANET links are used, so that users need pay only the costs of local calls if they do not have direct mainframe links. It may be prudent to review the choice of network in the future, and this may have implications for cost.

Overall, however, the costs of participation in this important project are at this stage within the capacities of most teacher training institutions; the input of time is the most important element of cost.

TYPICAL PLUTO ACTIVITIES

While PLUTO was launched, effectively, only in the early months of 1988, a great deal of activity has already taken place. For example, PLUTO participants are already

- *exchanging class data which allows for comparative analyses of different distributions within each country,*
- *jointly creating courses on the art of curriculum development*
- *planning hypertext course development projects*
- *undertaking each year to create and supply to the network one major database resource,*
- *preparing for each other resource packs which give a micro-picture of their respective environments,*
- *exchanging expertise on satellite weather data in geography,*
- *having collaborative projects in the field of English as a foreign language.*

Current development is examining the potential of language teaching in French, German and Spanish and on the uses of desktop publishing as a basis for language work. ***Experience so far suggests that the only limitation on the potential of PLUTO is likely to reside in the imagination of its users.***

CONCLUSION

In a very short time, the PLUTO Project has established firmly its high potential as a model for the education systems of the future. The Project team and its sponsors believe that it has a valuable contribution to make, not only to strategies for the introduction of the new information and communications technologies into the classroom, but also for the development of international understanding and co-operation. In both these respects, the focus of the Project upon the teachers of the present and of the future is felt to be of critical importance.

GLOBAL EDUCATION TELECOMMUNICATIONS NETWORK

Sheila Offman Gersh, City University of New York, U.S.A

Introduction

During a visit to London two years ago, Dr. Alfred Posamentier, Associate Dean at the City College of the City University of New York was told to meet his colleague at the Mayflower Pub. After further conversation he learned that the Pub was the place frequented by the Captain of the Mayflower. In the United States little is known about the place from where the Pilgrims set sail, who the captain was, or what they did before they left. Students in America are aware that the Pilgrims originated from England and left because of Religious persecution. They also know that the Pilgrims landed at Plymouth Rock and prepared for a feast which was known as the "First Thanksgiving." Therefore, a sharing of historical events learned from different perspectives seemed to be highly desirable.

Discussion about how enriching it would be for the children in New York and London to learn more about each other and about events that affect both groups led to the development of the Global Education Telecommunications Network (GETN) project. It was decided that telecommunications using electronic mail (e-mail) would be the tool to help the schools communicate to each other. The search for a convenient mode of communication led to the initiation of the GETN project.

Objectives

Major strides taken by telecommunications technology in the last few years suggest that children educated today will live in a far smaller world; a world where international communication will be as commonplace as a local phone call. To both prepare students for that interdependent world and to strengthen and enrich existing curriculum and instruction, New York public school teachers and their classes in some twenty elementary and secondary schools have, for the past year linked through e-mail with their counterparts in London and Vienna. Participating teachers have developed special classroom projects that enable their students to learn about other cultures, communicate with students abroad, and participate in inquiry-based learning projects. Children in classrooms around the world are collecting and sharing data, expressing their views and discussing real and pressing issues. The goal of the project is to utilize telecommunications technology and international collaboration to improve learning and instruction for participating school children.

Project Design

New York City Metropolitan area

Approximately 25 schools are presently participating in GETN. There are three to five teachers with classes of 20-25 students in each school linked with a class in the UK or Austria to develop inquiry-based curriculum enrichment projects. Participating teachers have received training to further their technological understanding. This has included sessions on getting started with "e-mail" where participants using communication software link up with Dialcom to receive and send messages. When needed, teachers are given training in word processing so that they can prepare their messages off-line and use the concept of downloading and uploading, thus, saving communication costs. Additional training is given to introduce participants to the New York City Board of Education's electronic bulletin board.

Schools in New York are linked with schools abroad in several ways--by school, by grade level, or by project interest, where possible. Very often teachers negotiate and brainstorm their project ideas after they have been linked. The most successful projects have been, though, with schools that already had a similar project idea before the linkage was made. In addition to teacher exchange, there is a great deal of student exchange.

In many schools the project began as an electronic pen pal experience for the students but later developed into the inquiry-based research project where students began discussing their data. The cultural exchange has been most beneficial on both sides because students are gaining an international understanding of other countries.

Teachers in New York get on-line on a daily basis. At some of the schools the teachers prepare and send all of the messages, while in others, the students prepare the messages and the teachers send them. Because of the lack of equipment and/or time, there are few instances where students do the on-line work. It is anticipated that as schools get more equipment, more student involvement in the e-mail transmission will take place.

The teachers in New York are further supported by CCNY graduate courses whereby participants are given assistance in project development, curriculum development, technology training, and using telecommunications in education. The Project Director and Project Coordinator further support the projects through site visits to the schools.

London

In London approximately twenty-five schools have been recruited to participate in the project. Initially there were some funding problems, but once these were resolved, the schools were linked with an American counterpart. The schools are visited by the Project Coordinator who helps link schools and who monitors and evaluates the program. The project is supported by In-Service Training at the South Bank Polytechnic to introduce and explore the technology, to examine computer practices in the participating schools and to explore curriculum issues in both the English and American education systems. Participating teachers are expected to share their experiences at the class sessions.

As a result of a recent visit to the British schools, I was clearly able to see "first-hand" the excitement that this project is generating in London. The students are eager to receive and read their mail from their American friends. In addition to the inquiry-based projects being created, the students are learning about the culture, life and experiences of the American students. The telecommunications projects have helped improve the students' writing style. Initially they were writing short sentences which were first hand written in the notebooks; later they began composing their messages at the computer and began writing longer sentences. In very few instances are teachers preparing the messages for the students. Each student keyboards his/her own message. The experience of writing to an audience, rather than for their teacher and a grade, also helped improve their writing skills.

What fun the students had when they began comparing how things are said in New York and London (ex. sidewalk, pavement; subway, underground; etc.) It is evident that the British students are learning a great deal about life in New York. They have become familiar with the TV shows, the music, the fashions, the likes and dislikes of American students.

Teachers have also developed friendships through this project. Several British teachers have visited New York and met with the teachers and students involved in GETN. That has added further excitement for the students in New York. During my visit I attended meetings with administrators and teachers to discuss the projects and find new links. Site visits to schools were helpful in learning more about the British school system. Face-to-face international meetings with British and American Coordinators helped all parties involved to better understand the successes and problems of the project.

Technology Applications

While our society continues to undergo significant and rapid change, our school system often resists change. Increasing dependence on complex technology and the transformation of the world into a global village are two important examples of those rapid changes. Students who graduate from our schools must acquire a better knowledge of the use of new technologies and a greater understanding of other cultures.

The GETN project seeks to address each of these problems by: making learning more exciting and motivating, helping students develop greater technological sophistication and by promoting deeper understanding of other cultures. Based on the success of the project to date, it is indeed possible to accomplish all of this and to contribute significantly to the way education is practiced in our schools today.

Telecommunications, using e-mail, is an important part of GETN project. It enables the linkage between schools in the US and abroad. The one requisite necessary to participate in GETN is for the school to have the following equipment:

computer
printer
modem
outside telephone line

While most schools already have the first two, it was necessary for some schools to purchase a modem and obtain an outside phone line. Communication and word processing software are also needed and is provided to the schools if needed. The communication system that provides the e-mail service for the schools is Dialcom. Each school is given an e-mail number to allow for the schools to connect to other e-mailboxes here and abroad. Small messages are sent on a daily basis. Large amounts of information are also sent in the form of files stored by word processing. The files are uploaded and sent. Teachers also "download" (save) files received onto a data disk that will enable them to call them up using a word processing program. The transmission of this data in either direction is quite simple. The main communication system used in this project is Dialcom. Dialcom not only offers the capacity to send and receive messages, but also makes a variety of data bases available (e.g. AP News, Dow Jones, Airline Reservations, etc.) that helps the students and teachers to do research for their particular project. Teachers have received training in how to use Dialcom most effectively and the training is on-going as needed.

The New York City Board of Education also has an electronic bulletin board system called NYCENET. This system offers to the teachers in New York City an opportunity to communicate with other teachers in the city via private messages, public messages or public discussions. There are several data base services available also. Teachers have an opportunity to use the Grollier's Encyclopedia, Curriculum Guides for many subject areas, UN information, buying service for school supplies, course offerings by the board of Education, AP News, and Dow Jones report. This service is free of charge to all New York City schools teachers.

GETN has been of value to the students because it fosters increased communication and dialogue via e-mail. It also enables students to become familiar with and motivated about the latest telecommunications technology.

Support Systems

The GETN Project was initiated by the City College of the City University of New York in conjunction with the Polytechnic of the South Bank, and the Polytechnic of North London. Participating teachers in the New York metropolitan area are enrolled in a three-credit Graduate course at City College entitled "Curriculum and Instruction in Computer and Telecommunications Technology." Faculty at City College are helping teachers develop curriculum materials for each project. While the College has assumed a leadership role in the project, there is close collaboration with the Office of Computer Resources of the New York City Board of Education. For the past year, the project has received support from the local school districts and by Dialcom, Inc. That support has enabled disadvantaged students at all levels (K-12) in the New York metropolitan area to become part of GETN.

In London the Coordinator finds the links for the schools, visits the sites to consult with teachers about the projects, maintains liaisons with the local education authorities, particularly with inspectors and advisors. In addition, he prepares reports and evaluations about the projects. In-service training is given to the teachers as needed. Teachers meet informally to discuss projects with other participants.

Development of Project Models

The purpose of this project is to make school learning more interesting, more real and more immediate. Reading, writing and thinking need to be activities that spring from meaningful experiences of the student rather than from textbooks, workbooks and exercise sheets. Teachers have reported that unlike more typical instruction, student who participate in telecommunication project have been: exceedingly enthusiastic about doing work they know will be shared with students abroad, curious about comparing their culture with others, interested in learning about the technology that permits this communications, eager to read, think about and discuss communications sent by their counterparts, and delighted to write meaningful replies.

A key reason this project is of value is because it fosters increased communications and dialogue. Only through dialogue can meaningful learning take place. Other reasons this project is so important include the fact that it:

* raises interesting, important and "real" questions that can be researched by participating classes, and allows students to do relevant and meaningful work

* initiates learning as meaning-making and constructive rather than viewing students as passive receptors of information

* results in meaningful and useful end products

* facilitates students' roles as the producer of knowledge and gives them a sense of ownership through the sharing and exhibition of their work and

* promotes a greater understanding of and sensitivity to other peoples and cultures.

There are currently ten model project that were initially created by teachers in New York, London, and Vienna. These project have now been further developed and systematized at City College by participating teachers and college staff in order that teachers anywhere in the world can participate in them. Special material packets for each project are being produced and will include: project description, welcome packets, a list of project objectives, suggested project activities, appropriate resource materials, and evaluation guides. These materials packets are crucial for structuring and guiding teacher and student participation in each of the projects. The model projects that were developed are:

1. A Visitor's Guide to New York and London

Students will visit and do research about sites in New York and communicate with students doing a parallel project in London. Students will describe their field trips and create a visitor's guide.

2. Immigration

Students will study issues related to immigration. They will interview classmates, friends, and/or relatives to learn about the reasons for immigration and the problems and experiences new immigrants have after arriving in New York (or London).

3. International Newsletter

Links with classrooms in Iceland, Sweden, England, Japan and Canada will result in a newsletter. Newsletter will contain current events, sports, local and school news, top 10 songs, cultural traditions and fashions. Newsletter is produced biweekly by a different country.

4. Acid Rain

Students will be involved in testing water samples from a variety of sources for acidity. They will explore causes and impact on the environment and compare data, issues, and possible solutions with co-researchers in British classrooms.

5. Creative Writing

Students will create a bicultural literary journal to include poems, short stories, and essays written by students in classrooms here and abroad.

6. River Project

Students will compare water samples of the Hudson River with the Thames River and explore issues of pollution and possible solutions.

7. Trends and Lifestyles

Students will work with other British and American classes to explore differences in social, cultural, and fashion trends today and twenty-five years ago.

8. Current Events.

Students will compare the way the news is reported in London and New York newspapers and other media and how people from the two nations feel about different events?

9. Teenage Pregnancy and Teen Parenting

Students will survey teen social behaviors, mores, and beliefs about parenting and parenthood and compare their data with other cultures.

10. Employment Survey

Students will study employment opportunities for those graduating secondary schools here and abroad.

Problems

Although teachers and students participating in this innovative educational project, have experienced a great deal of success, GETN has had its share of problems. Through careful monitoring, though, most of the problems have been resolved or will be resolved very soon.

Differences in school calendars have been a cause of concern. The school year ends one month later abroad. In addition, many of the school holidays and breaks are either different or longer. This has led to student and teacher frustration because there have been delays in the exchange of messages and information. Very often, our schools are off for one-week and then return to school to learn that the linking school has just begun a break the day we returned.

An understanding of the different school systems is necessary for the program's success. In the US there are elementary, jr. high, and secondary schools. In the UK there are primary and secondary schools. In the US, secondary schools begin at age 14, whereas in the UK it begins at age 11. Several times we had 11 year-old British secondary students linked with 17 or 18 year old American students. The British schools have until recently emphasized their system on themes rather than subjects, thus, making it difficult to link some classes. In addition, many British students leave school at the age of 16 where as in the US, they leave at 18. Those who choose to remain in school are preparing for national exams leaving little time to do "extra" projects. Recently the National Curriculum has been implemented in England, thus making the system similar to the one in the US. More exams are now being given at many grade levels. Since technology is emphasized across the curriculum, the GETN project meets many educational goals in the UK whereas in the U.S. the technology component is not the major focus of the project.

There have also been technological difficulties that have caused delays in the project. Occasionally the Communication system malfunctions and creates a delay in the transmission of messages. Sometimes a teacher joins the project without any technical experience. It then becomes necessary for the coordinator to visit the site and train the teacher in how to use the computer and the software. Not only is it necessary to become familiar with the communications software package, but many teachers also have to become familiar with word processing. Other technical problems have been caused due to faulty phone lines and/or problems in the communication systems. Teachers have not always received e-mail that has been sent.

In order for a teacher to participate in GETN it is necessary for the school to have a computer, printer, modem and dedicated phone line. Problems have occurred because modems were not available at all schools and once the schools received the modem, very often the phone line was located in another area. In some schools, outside phone lines are only available in the principal's office or in the library. Since on-line time very often does not exceed 30 minutes a week, teachers often transport the computer to the area where there is a phone. However, in cases where the phone lines are located out of the classroom, it makes it very difficult for the students to do the on-line work.

Teachers participating in the GETN program need training in a variety of areas. Technology and software training is required so that teachers become familiar with the telecommunications techniques. Teachers need to understand how to use the communication software as well as how to use the various functions of Dialcom. Technical difficulties that sometime occur on a daily basis often cause a great deal of frustration and creates further delays in the project.

In some cases understanding another school system has caused problems because instructional modes vary in New York and the UK. Teachers in the UK have more freedom about what they teach and how they teach. In New York, elementary school teachers have more flexibility in curriculum matters than teachers at the junior high or secondary schools. State mandates make it difficult to add more to the curriculum than what is already required.

There has been some concern about the time needed to do the project. Teachers in New York are spending a great deal of time preparing messages and sending them. In most schools, teachers, not the students, are doing the keyboarding. Some teachers arrive at school very early to do this work, while others stay after schools to do this. At the elementary grade level teachers tend to have enough time to fit their GETN projects into the curriculum. However, at the secondary level, it is often a hardship to fit the GETN project into the curriculum because State curriculum requirements leave little time for e-mail in the curriculum unless the class is an elective or a computer lab class. Teachers have shown an extraordinary amount of effort on their part to work on their projects. Very often it is enthusiasm alone on the part of the teachers and students that have resulted in the projects becoming so successful and helping to resolve the problem .

Teachers on both sides often complain that they do not get enough technology and administrative support. Much has been done to correct this problem. Coordinators have increased their site visits to the schools to assist teachers with any difficulties they may have. By spending more time monitoring and evaluating, coordinators are more aware of the areas that need improvement. All in all most of the problems have been resolved and as the project continues the number of problems should decrease.

Conclusion

As we more fully understand and develop the instructional applications of telecommunications technology, it is anticipated that more students, more schools, and more countries will be added to the GETN network. By linking curriculum development with technology as tools to facilitate student problem-solving and intellectual growth, GETN may well point the way for educational and international understanding into the next century.

COMPUTER-MEDIATED WRITING AND THE WRITER IN ELECTRONIC RESIDENCE

Trevor Owen, Riverdale Collegiate, Ritz Chow, University of Toronto, CANADA

At Riverdale Collegiate Institute (RCI) in Toronto, technology is used for writing in the English classroom, and for extending that experience by communicating with others, primarily students, writers, and teachers throughout Canada, North America and the world. Our work in language-based computer-mediated communications (cmc) is known as "Computer-Mediated Writing". The centrepiece of our program, "The Writer In Electronic Residence" project, is supported by Simon Fraser University. Over the past two years, this project has been replicated in other school districts.

Language Is The Key

These programs are about writing and communication, and embrace cmc in the English classroom for two reasons: [a] the nature of on-line interaction is textual and, therefore, appropriate to writing and commentary; and, [b] the on-line forum provides a certain equity of use, placing students in control of the media before them to broaden the shape and scope of the classroom experience.

We know now that cmc links offer meaningful opportunities for language development and proficiency. Students control their own experiences in an atmosphere where tolerance is promoted as a natural result of seeing the world as another might. But we know, too, that a need exists to interpret experience within a meaningful context. To this extent, it is clear that cmc offers an oral possibility--*especially when the telecommunicated experience is incorporated into an existing constituency*. We have identified this need to interpret experience within established, participating constituencies as **"local shape"**.

At Riverdale, we view the telecommunicated experience as a language activity, and we believe that many meaningful opportunities to summon language flow naturally from these links--both online and as a result of having been online.

Writing With A National Reach

The first of these projects was undertaken in 1983 and offered Toronto students access to contemporary works-in-progress and commentary by Canadian writers who were participating in *SwiftCurrent*, an electronic literary "magazine" created by Frank Davey and Fred Wah. *SwiftCurrent*, which was "housed" at York University in Toronto, provided writers in Canada with a means of textual communications in public conferences organized by genre, as well as via a private electronic mail service. As participants on *SwiftCurrent*, students were not only able to tap directly into these works, but *they could correspond with the writers directly via the internal electronic mail service.*

Other telecommunications-based projects probed databases and encouraged independence through information retrieval. While each of these was worthwhile to some degree, the most exciting and, I believe, meaningful projects focused on original student writing, which revealed the impact of technology on language development and proficiency.

The Writer In Electronic Residence

Between February and June, 1988, students from Riverdale (and elsewhere in Toronto) and British Columbia participated in the first "Writer In Electronic Residence" project with poet Lionel Kearns, who was located in Vancouver, British Columbia, some 5000km to the west. The students composed original works of writing and posted them, via modem, on a computer conferencing service made available by **Simon Fraser University**. Kearns offered commentary and his own insights, and encouraged the students in specific ways. This encouragement included peer response, which emerged as an important component of the project.

The English class involved (Ontario grade ten, 14 - 16 years of age) was housed permanently in the school's computer lab. During the project, Kearns arranged to have students from British Columbia participate in the project as well. Individuals from in and around Vancouver were joined by a high school English class (grades eleven and twelve) from Cariboo Hill Secondary School in Burnaby, B.C. Taken together, these students generated some two hundred pages of original writing and commentary.

Writing, *Not* Computers

Like other, more traditional writer-in-residence programs, the RCI project assumed that the creative writing process could be encouraged in the classroom by the presence of a professional writer working directly with the students. It also assumed that computer-based word processing and on-line communication could be used in this setting by the professional writer to enhance students' creative writing skills, give students added insights into the craft of writing, and increase their writing productivity.

"What a WONDERFUL learning experience it has been," wrote student Yit Yin Tong, who entered grade eleven at Riverdale this year. "It has given me a new perspective on learning, and learning how to learn. With other writers of the world, we have all responded and contributed to one another. I see this as something that has changed my life." She adds that "education shouldn't always be within classroom walls." Others agree. Yit Yin received the Lawrence Weston Creativity Award for her work on this project.

Meaning: An Excerpt

I should note that pseudonymous participation is available as an option on this computer conference, and that it extends to all participants, including the writer(s) and teacher(s). Accordingly, students were free to invoke this option and enter their names, pseudonyms, or initials as they liked.

The following poem and discussion, recently excerpted in a Canadian small press publication, *what* magazine, is offered as an example of how meaning evolves in the computer-mediated place. Its topic is disturbing. Its discussion is revealing.

9752. It

Rc 02:28 Tue Apr 5/88 (revised) 54 lines

"To suggest is to create. To name is to destroy."- Lionel Kearns quoting someone else

did you know
it takes only 10 minutes
on good days

that is
when the child is feeling
particularly trusting &
doesn't bite his or her lips
stubbornly
when there is no need for chocolate promises
or movie passes

but then
it also depends on you...

if you've had one too many
& time is your friend & you'd rather go the distance

or perhaps your big hands
fumble on tiny clasps & zippers
...can't rip the damn thing off--how
would you explain...
so you smooth your affection over chubby arms
smile
say "let's play make-believe"
(2 minutes if it's fun)

finally you have
a naked body on a bed or a sofa or the broadloom

it's your turn
to make it happen
if it doesn't come
it may take a minute or two
and you're in overtime
but it was worth it 'cause the air is heaving
your blood pierces pale skin
your ears club rising whimpers
your eyes are gods & sweep the ceiling

"beautiful" a voice thunders

best part is
that it continues even after
the child is home

on average
on good days
on top
it takes 10 minutes

9752/1.

Lionel Kearns 02:13 Mon Mar 21/88 5 lines

Well, ok, rc. You have given us something to consider here, with your suggestiveness and your irony. LK

9752/2.

Trevor Owen 08:20 Fri Apr 1/88 12 lines

There's a progression in this piece that comes from the "nesting" of lines, which takes you from "here" to "there". I think this form is what makes the "horrible" here possible, because it lets you stick your toe in cold water & make the unfamiliar just familiar enough to go a little further, before you know you're in too deep or, at least, deeper than you might have wanted to go. While you bring us back with this form too, (thank you) we are a little changed, which is a good thing to have done to us. TO

9752/3.

JK 11:45 Tue Apr 5/88 6 lines

I have been thinking about this poem for weeks. It is obviously about child molesting, but I can't figure out what you are saying about it? There seems to be no criticism of the act even by implication?

I would like to know what your intention was in writing this poem?

752/4.

JK 11:47 Tue Apr 5/88 1 line

Are you a child molester?

9752/5.

Rc 19:33 Sun Apr 10/88 16 lines

Hello JK:

I am not a child molester. If I were, I do not believe I would write about it unless I felt no shame in my actions.

The intention behind "It" was to disturb the reader. I hope it did not amuse anyone. This poem makes no judgment on child molesting (at least explicitly).

It is merely a painting. You decide how YOU feel about it.

What I would like to add is that it is simple to condemn child molesting. It is difficult to condemn the child molester. If a child trusted you, would he or she not trust your actions as well?

Thanks for your reply. I hope I have cleared some things up for you.

9752/6.

Lionel Kearns 00:43 Fri May 6/88 9 lines

What is a poem for? To give you a bit of a jolt. To hang around in your head and make you think about things you would not normally think about. To force you to consider the world or life in a new way. To re evaluated what is perhaps hidden under the old cliches. I think this poem makes it on all these grounds. A poet has to have courage, has to put his or her words at risk. This kind of poem is worth it.

LK

9752/7.

Col 08:02 Tue May 24/88 62 lines

Mother, Stay Home

She sat on her bed
Hating herself
as tears rushed out from her blue-green eyes
Looking around the room,
-She observed how perfect it looked
-How perfect her home looked to the outside world

Remembering the times
when she was younger and would
go outside in the backyard
and sit near the swimming pool with her parents
sipping ice-cold lemonade
and noticing an occasional puff of white cloud
while looking up at the pale blue sky
-the happy times

But then Mother
-her sudden illness
causing her to be in and out of the hospital
Away from home
-which isn't safe when she's not there

And father
-coming into her room those nights
Like tonight
She loathed the sight of him

She had to do something. But what?
Her mother would believe her...Right?

In Rc's poem in discussion '9752' I agree with her reply to your response, J. If you are a child molester you would have to be bold to want to reveal to everyone your hidden identity. In my poem "Mother Stay Home", it deals basically with the same thing. Now think about it J, if someone had incest going on in their family, don't you think that they would be a bit scared to even touch on that topic? That's why I feel that you either think that you're some great critic or you are just not taking this 'Simon Fraser' project seriously. J, why do you insist on putting down peoples poems or criticizing them in the most cruel way? "Are you a child molester?" Yah, right. For example, the WHIZ KID wrote a poem in discussion '9640' describing HIS personal feeling of Riverdale C.I. I stress the word 'his' because maybe I see Riverdale in a different perspective and I've noticed that you've already drawn your conclusion on Riverdale and its students so I'll leave you with that one. You can't make people write what you want them to. You said to the WHIZ KID that he should only write poems that are important. J, something that is important to you may not be important to someone else and vise versa. How do you know if the WHIZ KID's poem was important to HIM? What kind of world would this be if everyone thought the same way? Think about it J.

Col.

9752/8.

Rc 09:06 Wed May 25/88 34 lines

Col:

Thank you for the reinforcement. I admit that when I first read J's question ("Are you a child molester?"), I was taken aback. At first I was indignant. But then I realized that, depending on one's tone and intents, the question could be a very valid one. I am happy to say I am not a child molester. I am even happier to say that I realize I have the potential to molest. No, I am not a monster with a clean grin. What I mean is that we all have the potential to act in endless ways. The attitudes we CHOOSE to keep or discard is what makes us distinctly human. I see the act of child molesting and CHOOSE not to perform it. It exists (child molesting), but I will be on the look-out for its deep ditch.

When it comes to child abuse, I am quite violent (no pun intended). Vulnerability is dangerous, not only to the one who possesses it, but also to the one who sees it. The media is a great perpetuator of sex. Children are exposed to sex in all its stages and forms. Some adults claim that a child seduced him or her. Possibly. But aren't the children just mimicking what they see? Do the children realize to the full extent of what they are initiating? I believe not. And here, I believe the responsibility lies with the adult. With the benefits of adulthood (driving, voting, drinking, experience, etc.), comes the responsibility. The adult should prevent child abuse. It is sad that we must teach our children to say no. I feel there is something very wrong about a child TELLING an adult not to molest him or her.

I'm glad you wrote about it in your poem, Col. I think that if we wrote or talked more of "taboo acts" in a NEGATIVE way, we may avoid performing them. Keep writing and thinking!

Rc

Riverdale C.I. Writing Conference at Simon Fraser University, Works On-Line as of May 24, 1988

Equity

"It Was An Odd Pleasure To Be Taken So Seriously"

The results of this project have reached far beyond the kilometers that separate British Columbia from Ontario, or even writers from students for that matter. In the first instance, for example, much of the writing demonstrated how landscape and a "sense of place" affects, or even frames, expression and interpretation of meaning. Taken together, expression and response in the computer-mediated forum provide a meaningful, language-based context for ideas to be offered up in written form. In the second instance, the project demonstrated how writers and students can exist together in a medium that refuses to distinguish between them. That distinction is left to us. One student, who chose the name "helga", commented on this in her evaluation of the project. You should know that she participated on her own, from her home rather than school.

10736. EVALUATION OF THIS PROJECT
10736/7. helga 12:49 Mon Jul 18/88 28 lines

I suspect that we all understand how valuable the "Electro-Poets" has been, and how lucky we were to have been involved. It would be difficult for me to type in some unique reason for it being so neat, so I will instead type in what we already know.

I found the concept to be somewhat like a living book of poetry and short stories, as we were able to not only read each piece, but discuss it directly with its author, or even (!) other readers. To top all that off with anonymity (some with more than others) was sinful. I wonder how different our comments, and writing would have been, had they been made face to face.

The program had strong air of sophistication.... It was an odd pleasure to be taken so seriously, and it in turn encouraged (me) to take everyone else the same way.

I was also impressed by the opinions and styles of the 'students' (how else can I put it?), especially those who dared comment on other pieces, or submitted their more vulnerable, off-the-wall writings.

My only criticisms are mainly for myself, as I hesitated in entering some of my own pieces due to the fact that I tend to be thin-skinned and defensive. Therefore, and I am beginning to see that this aspect is really in 'the program's' favor, this is not for the self-conscious writer. It is more for the writer who is willing to value criticism, and the giving of criticism. I wonder what the use of writing is without it, yet it is something that takes more than a little getting used to.

Over the past year, Canadian writers David McFadden, Katherine Govier and Guy Gavriel Kay have participated as writers-in- electronic-residence, and the program has begun to be replicated in other school districts. Additional links are currently being established with other secondary schools in Ontario and B.C., and schools at all levels in the United States, Europe and Britain. We are interested in seeing whether the participation of other young writers might continue to develop beyond Riverdale, and if some interaction between these writers--and their schools--might be fostered in meaningful ways.

Ritz Chow, who currently attends the University of Toronto (Pharmacy), participated in these "electronic residencies" for two years and offers her thoughts, below.

Ritz Chow: The Computer-Mediated Writer

I first became involved in the process of writing with a computer in my pre- university year *(Ontario grade thirteen)* at Riverdale Collegiate in Toronto, Canada. Trevor Owen, my English teacher at the time, pointed me in the direction of the keyboard and cursor. He has since kept me electronically connected into the creative potential of a computer screen.

For my grade thirteen English project, I "hooked" into the *SwiftCurrent* writers' conference, of which Trevor is a member, and read unpublished works posted by a few Canadian writers. I focused on Lionel Kearns, a poet and an ex- professor of English from British Columbia, and included a few of his poems in my essay.

The following year, while I was attending the University of Toronto, Trevor invited me to join the "Electro-Poets" conference set up at Riverdale Collegiate. Lionel Kearns was to be the writer in electronic residence.

Introductions

Now, I'd like to introduce Lionel Kearns and the other writers who have been involved in the "Writer-in-Electronic-Residence" program for the past two years. Unfortunately, they were stopped at customs, but their words slipped through skillfully.

LIONEL KEARNS--poet and ex-professor from British Columbia, Canada. From his book, Ignoring the Bomb:

Report

Watching the ambiguous people turning away
from the Anti-Nuclear petitioners
I am filled with wordless imperative

She and I are still living
in this house on the corner

In these days of vapour trails and statistics
we raise a few flowers and children
as fast as we can

Art

It touches you there, touches you right
there, so that you stop, and for a moment
while a small electric current rushes
down your spine and tingles your guts
you know that you are alive. Art is not
something inside or outside of life. It is
more of a shape that life sometimes assumes
like a stick whose end has been sharpened
into a point.

DAVID MCFADDEN--poet from Toronto, Canada. From his book, My body was eaten by dogs:

Death of a man who owned a swimming pool

In my bathing suit and sunglasses
carrying a portable radio
and a large bottle of Quick Tan
I walked into this guy's back yard
on Mountain Brow Boulevard
He'd never seen me before
He was sitting on a lawn chair
with a gin and tonic
as I put down my stuff without a word

walked out on his diving board
and plunged in

swam around for about ten minutes
climbed out
dried myself off
turned on my radio
put on some Quick Tan

The guy just sat there looking at me
Oh hi I said as if I'd just noticed him
I hope you don't mind me using your swimming pool
I haven't got one myself
Sure a hot summer we're having eh?

The guy didn't say a thing
He had a red face
and it was getting redder
and it wasn't sunburn

I think I'll have one more swim before I go
I said and plunged in again

When I climbed back out a few minutes later
the guy had fallen out of his chair
and was lying on his face on the patio

I turned him over
He was dead

KATHERINE GOVIER--writer from Toronto, Canada. From her book, Before and After

An excerpt from the story, *"The New Thing I'm About To Do"*:

"What do you know, you wretched little virgin? You're nothing, nothing. You don't understand a goddamn thing!"

And he pushed himself around the side of his desk and strode out, leaving me alone in his office. I stood there for a moment, my eyes ripe with tears I would never cry. I was good enough to listen to his troubles, wasn't I? I was good enough to be his friend all summer. If I was a virgin it was his fault as much as mine. (p. 64)

An excerpt from the story, *"The Bomb Scare"*:

...Marian began to think about betrayal. Perhaps he never betrayed her. Perhaps he just misbehaved. Perhaps the real betrayal had been hers, in refusing to take him back, in growing accustomed to living without the something this was. Whether love or another quantity, less refined. (p. 200)

GUY GAVRIEL KAY--science fiction author. Unfortunately, I do not have any of his material.

A Public Forum, A Neutral Floor

The structure of the "Writer-in-Electronic-Residence" conference was especially appealing to me because I could access it from my own room anytime. Often, I signed on at two in the morning when I could no longer read my physics or chemistry texts. I found the conference to be like a drop-in centre. I wrote simply because I knew there was an audience on the other side. The conference provided a public area where I could drop off my writing. My writing was out, not in.

The medium was textual, not vocal, not visual. The emphasis or focus was on the words themselves. I feel that this medium generated unblemished responses from participants because only the writing existed, not the writers. This was especially true for those who used pseudonyms with the "set name" command, and for those participants who had only the computer screen as their space of interaction. The black screen afforded the participants a neutral floor.

Experience Reflects Environment

With the introduction of the students from the west coast province of British Columbia or B.C., it became evident that experience stemmed partly from locale. The B.C. students wrote about the same feelings of love and betrayal as the students from Metropolitan Toronto; however, the means by which the students expressed themselves gave a clear reflection of their environment. Suddenly, the students of Toronto were tossed into the Pacific Ocean and high rocky cliffs. The students in B.C. used many images of nature, as opposed to the Toronto students who wrote of highways, subways, dirty diners and fashion magazines.

Writing is an individual process. One sits alone with a computer, the cursor blinking its own rhythm, and gives thoughts physical dimensions.

As Lionel Kearns wrote in the "Electro-Poets" conference: *"poetry involves tricking language into truth"* (discussion 9218/6), and, *"literature is art made out of language"* (discussion 9409/4)

There is a transition from thoughts to words, a mechanical process of the brain that fills a 7" by 10" screen. I discovered that the best part about writing is writing. And being read is rather fun, too. In the past electronic writing conferences, I was most surprised by the reactions of those who read my pieces. I came to realize that when someone read my piece, the words were no longer my own, but rather the reader's. It was the reader's concept of my words, not the words themselves, that had life. The static sentences travelled in the interpretations of the readers.

Concepts

My understanding of the written language and communication has changed considerably since I first participated in the "Writer-in-Electronic-Residence" project. I believe the computer has a definite niche as a writing tool, and as a form of human interaction. The impact of Marshall McLuhan's "global village" is evident in the satellites orbiting the earth, the FAX machines in homes, the electricity produced and consumed.

The small screen of the computer holds a great view. Not only can we glimpse the world through the computer screen, but the world can gaze back, into our rooms, into our faces, into our words.

References

Govier, Katherine, Before and After, Viking (1989)

Kearns, Lionel, Ignoring The Bomb, Oolichan (1982)

McFadden, David, My body was eaten by dogs, McClelland & Stewart (1981)

The *ELECTRO-POETS* and *NEW-VOICES* conferences are available in electronic and print form.

The authors gratefully acknowledge the financial assistance of the University of Toronto, Office of Student Awards.

THE FUNCTIONS OF A TELEMATIC HOST COMPUTER IN A TRAINING ENVIRONMENT: THE EXAMPLE OF THE CLEO

Maryse Quere, Centre de Recherche en Informatic de Nancy, FRANCE

Bernard Schmitt, Institut National Polytechnique de Lorraine, FRANCE

1 - INTRODUCTION

1.1 - THE CONTEXT

In France, there is a quite clear separation between initial training activities and continued training activities. With few exceptions, the former globally depend on a single ministry, the Ministry of National Education. The latters are much more spread and different tutelages take charge of their financing thus their follow up.

National Education Ministry expends all its structures, including those concerning telecommunications. We will not deal with this subject in this article, the interested reader can find a recent inventory in [1]. On the contrary, we present an experiment connected with different training sectors which are not dependent on the National Education Ministry, but which lean on a regional organization, quite the only in France : the CLEO, Centre Lorrain d'Enseignement assisté par Ordinateur (Lorraine Center of Computer assisted Training). Lorraine is one of the twenty two french economical regions, situated at the north-east of the country, with its two capital cities Metz and Nancy. Frouard is located somewhere on the motorway between these towns.

The CLEO has the juridical form of an association, it means that it associates several partners which aim at the same objectives and which assure the management together; later on, we shall call them "members". Created in 1986 by eight of them, CLEO includes fourty members today : namely nine private or public corporations (or federations of corporations), twelve public organizations of continued training, six services or laboratory of the university, an important research organization, twelve others organizations of popular training or education.

The CLEO is commissioned to expand the multi-media formation. It is a center of resources in attendance on its members but also at the public's disposal, and its activities are divided in four main sectors : documentation, trainers training, multi-media production, studies and research; the production being the bulkiest activity generator. But the documentation is indisputably the most spectacular sector. The CLEO disposes of the biggest courseware library in France, with about 1000 products available there.

1.2 - WHY A HOST COMPUTER ?

In France, the use of telematics is widespread. The MINITEL is now a familiar instrument, especially used in order to consult general public data bases (telephone directory, train timetables, ...) and dealings (correspondence sale, ...).

So it was natural, to the State which had been in favour of the creation, to give the CLEO a sufficient powerful computer in order to contemplate the gradual creation of a great number of services, as it is a BULL SPS 9 computer using the operating system UNIX which permits 48 simultaneous accesses, equiped with an interactive videotex monitor REITPAC from LOGISTA Corporation.

Very quickly, the server became an irreplaceable tool of communication between several persons spread over a whole region, owing to its electronic mail service and to the creation of a journal informing in real time of all the manifestations in this sphere, filed into items so as new products, publications, training periods, conferences and seminars, ... In this way, the symposium we take part in has been announced and has been attainable to every owner of a MINITEL.

Very fast too, after the disappearing of a national center, the CESTA [2,3], which vocations were the following ones, the CLEO commited itself to establish a data base of courseware and widely, multi-media training products data bases. On the one hand, this base is used to generate general or specialized lists on paper [4], on the other hand, this base is available on the MINITEL. In the same way was engaged the creation of a data base concerning experiments and research about multi-media training. Both bases are described in the following paragraph.

Should the host computer be used for the direct training too ? Advantages and disadvantages are well known :

(A1) each french man can easily dispose of a MINITEL, whereas he disposes of a micro-computer with more difficulties;
(A2) the coursewares stocked on a central host computer are more easily kept up to date than the coursewares stocked on floppy disks; the execution traces can go back to the host computer and can be used to improve the products;
(D1) communications are still expensive and the flows slow;
(D2) the minitel uses characters only (alphamosaïc code) and thus can be used for a few practices only.

The whole result between advantages and disadvantages still gives, for a few years more, the golden medal to the local apparatus of apprenticeship, micro-computers and reading image devices so as videodisc or CD-ROM. In return, the increase in remote training's devices gives back to the MINITEL its letters patent of nobility for a certain number of employments that will be detailed in the third paragraph.

2 - THE DOCUMENTATION FUNCTION

2.1 - DATA BASE ON PEDAGOGICAL PRODUCTS

The data base on pedagogical products (PP) aims at the final users, it means at the formative or at the staff in charge with training, without any specialized interrogator's mediation, as it is the case now for worldwide professional data bases. That is also the reason why each product is dealt with in a memorandum slip fitting on two MINITEL screens (24 lines x 40 columns), for we think that beyond, the information is not forceful enough anymore.

The PP base objective is to place at user's disposal a whole information permitting them to pick, according to some criterions, the multi-media training's product they are linely to use in training they are responsible for. Of course, getting such a list of potential products doesn't exempt them from viewing the products, after selecting them, in order to see whether they are suitable for the public and especially in order to see how they can employ them. The CLEO courseware library exists in particular for this.

The selection criterions choosen into the base affect *the media used, the field, the level, the author(s), the title, the editor, the type of use, the type of applying, the required equipment, the location.*

By *media*, we mean software, audiovisual or multi-media. The leaflet which is delivered with the software doesn't make the product a multi-media one. In return, a product delivered with a book, a software and a videodisc will be filed in this item, and each media will be dealt with in a separate memorandum slip. There are 147 *fields* (hierarchical list extensible to a maximum depth equal to four). The *levels* cover over school levels of the french system and the levels of the professional continued training. The *types of use* are connected with the pedagogy (for instance, self-training). The *types of applying* allows for instance to distinguish between a tutorial and a simulation. The *required equipment* is a very important thing for the final user. All the standard types of apparatus are loted. Lastly, the *location* allows the user to know the products he will be able to refer to in such or such organization near his home (we are now listing the main resources centers in Lorraine).

Added to these selection criterions, some others items : *the date of edition, the physical filing associated with the location, the description (analysis), some known users referring*. And, according to the media, *the duration, the support, ...*

2.2 - THE DATA BASE ON THE EDUCATIONAL NEW TECHNOLOGIES

The data base on the educative new technologies (NTE) is a documentary base more classical which aims at people looking for articles, books, reports, thesis, or any other document on the multi-media training. This public can seem different from the PP base public, but in fact, if they become proved users of multi-media products, the users of PP are potential customers of the NTE base. That is the raison why we gave them the same structure.

The usual customers of NTE base are persons in charge of training and searchers. In its speciality, this base is single in France, but more means will be necessary to reach some exhaustivity.

3 - THE MULTI-MEDIA TRAININGS MANAGEMENT

3.1 - WHAT IS A MULTI-MEDIA TRAINING ?

With the sense used above, a media is a spreading means which can be a mode of expression as well as an intermediary carrying the message. These two dimensions still exist with regard to multi-media training. Any pedagogical system which brings into action a strategy appealing to the simultaneous use of a computer, a projector of images, a tape recorder, a video tape recorder, a video user and a book of course, is given the qualifier of multi-media training.

This definition only take into account the means of expression variety, and to be more complete, we should also add the notion of transport. If the one who learns and the training environment are often gathered in the same confined geographical site, the postal tuition has existed for several decades however. Its success clearly showed that the locality unit of the different training phases is not absolutely necessary. It is a fact that with the breaking through of the communication new technologies, the possibilities of dislocation increase.

So, beyond means of expression, a multi-media training system can profit by all the possibilities offered by telecommunications (telephone, telematics, satellite connection, ...). This large variety of resources which forms such a system, is applied taking into account the specificities of each media. For instance, in the CAMELIA program (multimedia training to biotechnologies) the CLEO participates to, we use a set of five implements or medias in accurate fields :

157

- the *book* : complete development of the training scientific content;
- the *videoclip* : manufacture sequences in industrial environment;
- the *courseware* : simulation of experiments and gain of knowledge;
- the *meeting* : argumentation, exchange, emulation and valuations by direct contact;
- the *MINITEL* : communication between the learner and the teacher.

In this example, the MINITEL is the restitution support of information that has been emitted in another spot. It permits a remote communication that has several aspects we are going to see in details.

3.2 - THE COMMUNICATION IMPLEMENTS

3.2.1 - *The electronic mail*

It is above all the individualization implement. The learner can express himself clearly without witness. He speaks directly to the teacher he can ask for a piece of information he needs. And vice versa, the teacher can read the message he can give appropriate answers to. Each learner registered for the training owns a letter box he has access to through a personal code. A systematical diary relieving, by the teachers as well as by the learners, assure the system efficiency. The learners can also exchange messages.

As soon as they can have access to a minitel, learners and teachers profit by the service, wherever they may be.

At regular intervals, the host computer, which manages the electronic mail, can list the trace of the different exchange volumes.

3.2.2 - *The assisted solution of exercises*

This type of implement is in fact a specific applying we have developped. The whole information necessary to solve several exercises given to the learners is available in what can be called a resource bank. This piece of information is organized so that the caller, for a single call, can have access to a restricted assistance.

Straight away, the bank is accessible only through a code specific to each learner. This key will allow to memorize everyone's route in this bank.

The banner page shows the menu of the different exercises. The learner chooses an exercise he has been unable to solve directly. The first time he calls to the exercise, he receives a first level assistance of one or several screenful pages. Then, the developed applying plans not to give more information during this contact. Moreover, in order to encourage the learner to search, any later call within one hour after the first one will not allow the access to the second level assistance.

For each exercise, three or even four assistance levels are planned. However, if some difficulties should remain for certain exercises, it is always possible to have access to the electronic mail.

The bank supply in solution resources is made from the host computer or from a MINITEL with definite data elaborated by the teacher for each serial of exercises.

In certain cases, the access to the assisted solution shall be preceded by an evaluation phase of the knowledges owing to the authoring-system described further. This procedure is interesting when the proposed serial of exercises affects a defined field of the subject.

3.2.3 - *The data bases*

Any multi-media training system includes a written data support, a manual or a book in which the learner can find the complete development of the training scientific content. Especially, bibliographic notes can advice the learner to call on some reference books.

It is a fact that the written data support cannot be reactualized quickly, so, it seems important for us to complete and correct the written text data with an electronic data base. This base adjusted and specific to the affected training, accessible by MINITEL, suggests :

- latter bibliographic notes;
- correctings or modifications of the written text;
- concise complements of the written text;
- manifestations or exhibitions;
- visits of factories or laboratories.

3.2.4 - *The authoring-system on the host computer : an evaluation tool*

In a self-training process, one difficulty is measuring the acquired knowledge after an apprenticeship. The evaluation cannot be reduced to a final examination : indeed, at the end of a module, it is a good thing for the learner if he can see himself wether he has reached the objectives stated by the module, in order to study the following modules or, if necessary, to begin again an apprenticeship. It is also interesting that the tutor should be communicated the results, so as to begin an eventual process of support, in real time.

In order to achieve, it is necessary to have a bank of standardized tests, easily modifiable, which results can be dealt with in synthesis. Among the three medias likely to carry that sort of tests (paper, diskette, central host computer), the central host computer appeared as the most appropriated to these objectives, with the eventual help of the paper if the questions deal with graphical devices which cannot be display on the MINITEL screen.

Then, the question was : should we be satisfied with multiple choice questions (M.C.Q.), and so should we only use the creation software package given by our interactive videotex supplier, or should we go further ? A short inquiry on potential users proved that, if the multi-media trainings were to be used in a large variety of disciplines, M.C.Q. could not be enough for a correct evaluation of acquired knowledge. That is why we have achieved on the host computer, an authoring-system [5] respecting a certain number of constraints :

- portability : the code of the actual authoring-system (developed in C programming language) is interfaced with the interactive videography monitor, in a way that the system (and the tests) can be saved if ever a monitor or a machine has to be changed. At first, we tried to acquire a system that was not made in that way.

- availability of three types of exercises : M.C.Q., texts with blanks, open-ended question (we have limited the response to 40 characters because of technical constraints).

- data acquisition of tests by the training staff, on MINITEL, with a tool box including a text editor (we choose a linguistic form) , a syntactic analyser, a screen editor, a data set manager. This type of data acquisition allowing characters only, from his program, the author can call alphamosaïc screen composed on an ordinary terminal computer.

- path management in a questionary permitting a personalization to learners : the author language includes control statements as a programming language, and variables the author can have access to.

4 - PERSPECTIVES

On request by the professional training delegation (ministry of work, of employment and of the professional training), the BIPE (Bureau d'Information et de Prévision Économique) carried a study upon multi-media training market development. It stands out of this inquiry that if in France, under the term multi-media, we privilege training system using at best the totality of the available technical resources, as for americain people now, they privilege "digital only" solutions, carried by networks [6].

So, the CLEO has decided to head for research on networks with high rate of information. In that way, for three years, it has participated in works of a specification group of an exchange representation for interactive audiovisual applications (RAVI) [7]. Some hardwares and softwares including RAVI are now available, and in early times, the ISDN will permit the integration of services as teachware type and services now supported by the MINITEL. Now, this action comes out on standardization and the CLEO is involved in the DELTA program of the CEE, with the Centre de Recherche en Informatique de Nancy (LEAST project).

5 - REFERENCES

[1] Nicole MERCIER & Jean-Claude MAROT - *Télématique et Enseignement : inventaire d'expériences* - IDATE, Montpellier, 1987.

[2] CESTA - *Annuaire des Logiciels d'Enseignement* - CEDIC NATHAN, Paris, 1987.

[3] ADITE-CESTA - *Annuaire des Logiciels de Formation* - 1988.

[4] Jocelyne BAZIN - *Didacthèque du CLEO, Catalogue par Domaines* - Frouard, janvier 1989.

[5] Anja HABACHA - *Système auteur sur un serveur télématique. Rapport de fin d'études du cycle d'ingénieurs en informatique* - Université de Tunis, 1988.

[6] David R. LAMPE - *ATHENA MUSE : Hypermedia in action* - The MIT Report, February 1988, Volume XVI, Number 1.

[7] J. FROMONT, F. KRETZ, M. QUERE et al. - *RAVI : Representation for Audiovisual Interactive Applications* - RIAO 88, Boston, march 1988.

THE ELECTRONIC CLASS

Joseph Regev, Ben-Gurion University of the Negev, ISRAEL

Abstract

The various facilities for an electronic class are described: assignments, results, questions to the teacher, sending to teacher, pupil or all pupils, Q & A file, use of CAI, simulations and open tools, programming, tests, group games, IRO CAI, creative tasks, multi-variation courseware, instruction of literary texts, pupil oriented learning, several teachers, possible channels of communication. The human aspect and the status of present work, are also discussed.

Introduction

The electronic class is a class where the pupils do not sit together in a classroom but learn together using electronic communication to ask questions, give answers, compare results and voice remarks. There are clear advantages to such an educational modus operandi as there are clear disadvantages [1]. The electronic class is actually a tele-conference which deals with learning a certain subject but, as explained later, it is more than that. In this paper, several ideas will be presented and the status of the present work will be described.

Distance learning today

The ideas behind the concept of the electronic class are rather futuristic but even today there is a need for this type of learning for pupils who cannot or will not attend regular classes. These pupils are:

a) Pupils living in distant places where coming to school every day is impractical [2]
b) Handicapped pupils who cannot go to school or participate in the normal schedule of school [3]
c) working pupils who cannot attend school at the regular hours or cope with the regular load of studies
d) Pupils who were ill or absent for some other reason and missed their classes in a manner which was too severe to be bridged in a short span of time
e) Pupils with learning or psychological problems, who cannot cope with school
f) Talented children who find, sometimes, the normal progress in school, too slow or too tedious
g) Pupils who wish to learn subjects which are not given in the curriculum of their school [4]
h) Adults wishing to take part in a continued education program not available in their local facility

In short all the pupils who use distance learning or open-university type learning or who do not learn at all. All can benefit from such a form of teaching which allows them to be there in spirit without being there physically, in one vicinity or with pupils from all over the country.

Future learning

The educational school system has withstood all the onslaughts of modern changes which were tried such as: educational TV, viewgraph, CAI, individualized learning and many other promising ideas. One can explain why school resists all changes [5] but it is not clear whether school can go on with this resistance to modern technology and communication. The electronic class is a form where school can accommodate this need for change and improvement. Otherwise, school may find that the pupils turn away from it to look for education somewhere else. If many pupils have personal computers at home and telephone lines and some have also modems to allow communication, it is advisable that we do use these tools to educational advantage.

Basic form of the electronic class

As explained before, the participants in an electronic class do not sit together in a classroom but rather communicate through electronic communication from personal computers or computer terminals and in this way interact with each other. The participants are the teacher and the pupils. The teacher gives the pupils assignments, through the electronic communication or on paper and they work on these assignments, each one by himself, sending the results to the teacher in the same electronic manner [6].

The assignments may be to read some texts in a textbook, find information about a certain subject in the library, read a text kept in a file or sent electronically, perform certain exercises with the material they read, sum it up, or write essays on this subject, etc.

The response of the pupil may be just the answer or the essay required. It might be a question to the teacher asking him to explain something which is not clear in the text or in the assignment [7] or it might be a question or a request to another pupil to help him.

The teacher sends assignments and instructions to the pupils as they progress in their work. When asked questions, he may send the answers to the pupil who asked the question or to all the pupils in the class. The teacher may refer a pupil to another pupil or to a colleague. The questions and the answers are recorded in a small data-base and every pupil can access that data-base and look for the information he needs before sending the same question to the teacher.

The answers and the essays, with or without correction from the teacher, can be sent to another pupil. The answers can also be sent to all the pupils, with or without asking the other pupil to comment on them. They can also be put in a small data-base and read by all the pupils when they want to [8].

The assignment may be to solve a problem, a real unexpected problem [9]. The pupils suggest solutions and send them to the teacher along with questions. They can also discuss the problem with their friends. Thus a process of deliberation and trial may be taking place. The process may also be directed towards group deliberation and group problem solving [10].

The assignments may include using a CAI package. That can be done in a stand-alone mode and the final results sent to the teacher after being retyped or cut and pasted electronically or forwarded by the computer procedure. The CAI may be an integral part of the electronic class, so that every interaction of the pupil with the courseware is recorded and sent to the teacher. This allows him to monitor his pupils and intervene when necessary. This also allows him to find faults in the courseware and hopefully fix these faults and improve the courseware[11].

The assignments may be to use a simulation computer program as in a lab and produce a report. As with other assignments, questions and remarks may be sent and answers from the teacher received before the experiment is over.

The assignments may include using one of the programs which are called "open tools" such as a word processing package, LOGO, a drawing program, a music composition program or any other program which allows the pupil to apply his ingenuity and creativity and not necessarily give a simple answer to a simple question.

The assignment may include writing a computer program in one of the programming languages. In this case the error messages and their explanations may form another important data-base along the data-base of the final results - the required programs.

Tests

The electronic class may progress in the curriculum without any coercion, if the teacher likes it this way and the pupils respond properly. In most cases there is a need for tests and deadlines. The pupil may be allowed to take the test when he feels he has mastered the material or he may have to take it on a given date. He may be allowed to try informal tests to measure his ability and his knowledge. The teacher may write an examination and send it to the pupils or he may prepare it in advance. In any case it is preferable and suitable that the teacher has a data-bank of questions, each one with many variations (of the data or of parts) and from this data bank he may prepare a new examination, either manually (with a WP) or let the computer compile a random set of questions whenever the need arises. This allows the pupils to take many instances (and trials) of the examination, each one different, provided the data-bank of test items is large enough.

The answers to the questions, are typed to the computer and sent to the teacher. The assumption here is that the questions are open-ended and not closed multiple-answer questions. The teacher may grade these answers or he may ask the pupil to clarify his words (or even correct an error of negligence) before giving the final mark. The response of the teacher to the answers (including the remarks) are sent immediately to the pupil and some typical problems may be extracted and presented to all the others.

Electronic mail

Each pupil may send messages to any one of his friends, not necessarily concerning the subject matter [12]. He may send messages to all the class or to the teacher who may respond likewise [13].

There is a problem of how often each one reads his messages and replies. In order for this set-up to work out, every one must do it at least once every unit of time, say once a week. That applies to the teacher himself, who has to work quite hard.

Another problem is that of whether the teacher is allowed to see the communication between the pupils. This is highly inadvisable yet may be inevitable, if there is a problem of cheating (which is very common with Israeli children where cooperation is a value of more importance than success in studies, as measured by grades). This problem may solved by allowing some third agent, say the system administrator, to see every communication that passes in the system and to forward to the teacher only those messages which are clearly cases of cheating.

At this point we must also mention the problem of pupils finding ways to enter the teacher files, see the examinations before the time, change data, change their grades, etc [14]. The system must be built so it won't be so vulnerable.

Games

The assignments may include playing games, inside the computer or outside. The games may be group games where each player takes part with or against the others. This form of group interaction allows for a kind of activity which is not easily achieved with other games. If the principle is: he who gives the first right answer - he or his group wins, this allows every one to participate or at least try. Competitive tests may be taken in this manner. But games may designed so that they are more cooperative and less competitive.

One should note that communication software needed for other forms of communication (electronic mail type) is not adequate for group interaction which may require tele-conferencing type of communication [15].

Information retrieval

The teaching may be more oriented towards information gathering and information retrieval [16]. If local data-bases are available, the assignment may be to find all the relevant information in the data-base and reach some conclusions from the raw data accumulated in the data-base. The assignment may be to create the data-base by group action, each one collecting some information in some place.

If access is available to external data-bases [17], then the assignments may be more serious. The pupil may be required to search the large external data-base for relevant pieces of information [18] (which may in itself be a sizable problem) and then write an essay based on this information.

There is also that type of CAI which is IRO (Information Retrieval Oriented), where the software allows the pupil to access the data-base, look up a required item and from that item he can pass to other items which are mentioned in the former item. The pupil is to extract all the relevant information and then, put it in some order and use it. This form of CAI is not restricted to the electronic class environment but fits very well in that context.

Creativity

It implies from what has been said until now, that the electronic class can foster individual work, self expression and creativity. This point ought to be emphasized. The normal classroom cannot allow all the pupils to express themselves so much and show their creativity at the same time [19]. The electronic class environment gives each participant the chance to write his piece and send it to the teacher to be corrected, if need be. The teacher may then, send the best pieces (or all of them) to the other pupils to read and be impressed. He can store them in a file to be read by whoever wants to. He can accumulate them over the years, from one class to another.

The pieces need not be texts only. They can be graphic, allowing for visual arts and they can be audio, allowing for musical arts. For the time being, they cannot include talking pieces for not everything can be done in tele-processing today.

Multi-variation courseware

The electronic class allows application of a special mode of using computers in education, the mode I have called "Multi-variation courseware" [20]. The normal mode of using computers in education is that of tailored progress. Every pupil is allowed to progress in the subject matter as fast as his understanding allows, without waiting for the other pupils. This causes gaps to appear between pupils and the class to disintegrate. If we do want to keep the class as an entity, we have to revert to another mode. In this mode every pupil receives assignments which take into account his ability and the time given to finish the material. Thus advanced pupils may get more in depth information and more difficult problems, which average pupils cannot solve. On the other hand, weaker pupils are encouraged to spend more time with the computer and get more help so as to be able to finish the material with the other pupils in the class.

The idea is that there is a deadline for finishing every unit in the subject matter and every pupil will get to the end of the unit at about the same time. The reason for this stipulation is to eliminate the stigma of being an advanced pupil or of being a weak pupil. If you give each pupil problems according to his ability (with a random variation of course), no one can boast and no one need be ashamed of his achievements in the computer based learning.

In the electronic class this principle can be applied in the macro by the teacher who decides upon the assignments, not necessarily the same assignment to all the pupils. Adding a computer program to automate this process of assignment, can enhance this mode of teaching.

Other points

There are several other points of ideas which can be implemented in the environment of an electronic class and can be added here :

Instruction of texts: in a former paper [21] I have elaborated a little more about how one can teach a course about text (such as literature, philosophy, holy scriptures, history, etc.) in a computer without being confined to primary CAI which is clearly inadequate for this context. The text appears on the screen with several interpretations. The pupil has to read these interpretations, say whether he agrees with each one, which one he prefers best, etc. After giving this simple response, the pupil gets an answer of the teacher, prepared beforehand for the response had given. Later he may ask to write his own interpretation and add it to the file or he may send a message to the teacher and disagree with his answer.

Several teachers: until now the assumption was that there is only one teacher in the electronic class. Actually there is no reason for such a limitation. Several teachers can participate in the course, sharing the load or giving different points of view for the items under consideration. One teacher may be the resident one and the others may be considered as visiting teachers, appearing from time to time and adding their ideas to the interaction.

Teacher vs. pupil oriented learning: another assumption that can be found in what was written here until now, is that the process of learning is geared around the teacher. He initiates the assignments and he gives the final marks. This assumption is not warranted. Pupils may learn a lot out of their own curiosity. In this context the teacher only proclaims the subject and each pupil may pursue his own line of study. The computer, the library, the laboratory and the whole world are then a set of resources which the pupil can tap to learn about the subject. He then shares his findings with his friends. The learning need not be either this or that. It can be a mixture of both approaches.

Channels of communication

The electronic class is best achieved in a set-up where each pupil has his own personal computer and there is access to a central computer (via modems) which serves as the hub of the communication. There are systems where this central computer is just a micro-computer, on-line to a telephone line and a modem and dedicated to this purpose. Larger computers can serve this end better as they are usually always on and allow logging-in as their normal access procedure.

Other means of communication are disk servers which allow communication between micro-computers. In case even this is not available, one can manage with a system which uses a diskette as the hub of communication and transfers messages from this diskette to and from personal diskettes. The simplest communication system one can use for this purpose is a simple-minded one diskette system which allows every member to get messages left for him on that diskette and type in messages to the other member, messages which they will receive when they come in and use that system with that diskette.

Another possible set-up is that where each member has a computer at home, connected via modem all the time to his telephone and communication is taking place between the computers directly.

The human aspect

One may ask why bother to build such a bizarre system of teaching and communication? The main motive is to use the computer as a communication machine [22]. Until now most of the work with computers in education has been with the paradigm of Skinner. Rich and versatile as most educational computer programs may be, most of them are still aimed at achieving the teaching machine which at one point in time seemed to be the solution for all the problems of education (which are so many). After more than 25 years of effort the chances of realizing a real change in education through any or all of these computer programs - seems very slim indeed. In most of these programs, the teacher is a weak partner whose presence is there because he is the gate keeper to formal education but not because he is wanted there. Sometimes he is redundant altogether. The concept of the electronic class allows us to put the computer as an intermediary between the teacher and his pupils thus enhancing the communication between them instead of the computer coming between them and becoming a barrier to communication.

One small aspect of this concept is the art of discussion and argument. Having this type of communication, especially with tele-conferencing, teaches the pupils how to wait for the others to speak up, how to present their ideas and how to listen and avoid repetition and hollow arguments. This really need to be taught nowadays.

A more serious consideration is that of what type of communication do we get here? Electronic communication tends to make people be concise and to the point, which is a boon. But is it real communication between people? In some cases it is mere transfer of information but it need not necessarily be so. Let me take the case of the telephone as an argument. Did the telephone foster more communication between human beings or did it diminish it? We certainly go less to visit people and talk with them but on the whole we can approach many more people than before telephones became common in Israel and we can respond much more to their calls. Is it real human communication? In many cases it is. We don't see the faces and the gestures but on hearing the voices we add to them gestures out of the tones we hear. Electronic communication leaves out the tone but still we can add it from the choice of the words used and the atmosphere they create. As a book is not less lively than a TV film (and is actually much more because it leaves more to our imagination) so an electronic communication is not less human than a face to face discussion. The pros of electronic communication is that it allows every one to speak at the same time and yet to listen only when they are ready to.

Present work

Many of these points are ideas and hypotheses to be tried out and checked. I've tried some of them on several occasions

We have built an elementary electronic mail in Hebrew and made teachers, learning a computer literacy course, appreciate this tool.

I have taught a course of Unix, on a Unix mini-computer which realized some of these ideas. Each participant got an ordered list of concepts which he was to learn in this course. There was a vast set of explanations about these concepts, which may require each other recursively in order to be understood completely. There was a small set of examples where the pupils could see how these things were done in detail. All these were kept in computer files, accessible to all the pupils and were modified, improved and added upon as the course evolved. The main component of the course was the use of the electronic mail of this Unix computer. The pupils could (and did) send questions to me in the mail and I would respond within a few hours. Each answer (along with the question) was sent to all the participants (in electronic mail) and also put in a Q & A file. This file could be accessed as a whole (using a WP) or with a keyword as a parameter and the system would display all pages where this keyword did appear. A similar option was available with the set of explanations viewed as one huge file. There were very few oral lectures and they were needed only to introduce the members to this unusual set-up of learning. They could also use the computer for their needs, send messages to other members (in subjects not having to do with the course) and use the computer to communicate through the Bitnet communication network (accessible to many scientists in many universities all over the world) with colleagues abroad. The pupils had access to books about Unix and to a CAI package which interactively teaches how to use Unix. These were hardly used. Those who tried using the CAI package, claimed it was too slow and they got much more from reading the explanations and trying things out. The amount of effort I had to put in was enormous but the results seemed very effective.

The latest project we are involved with now is the building of a basic electronic class system using a common diskette as the channel of communication between the members, a system which will have many of the features described above. This project is still in its programming phase.

Bibliography

[1] Coffey, Michael: The Better Bulletin Board System. Creative Computing, 8(12), Dec. 1982. pp. 20-26

[2] Henri, France: Distance Education and Computer-Assisted Communication. Prospects, 18(1), 1988. pp 85-90

[3] Storm, Robert D.: Computers and the Writing Process. Perspectives for Teachers of the Hearing Impaired, 6(2), Nov. 1987. pp 5-8

[4] Field, Cynthia E.: Earn Credits On Line. InCider. 5(10), Oct.1987. pp. 87-88

[5] Chen, Benjamin; Anson, Jon & Regev, Joseph: Overcoming Structural Impediments to Computer Implementation in Schools: An Analysis and Proposed Strategy. in
Lewis, R. & Tagg, D. (Eds.): Computers in Education, Proceedings of WCCE81, 3rd WorldConference on Computer Education. Lausanne, July 1981. North-Holland. pp. 311-315

[6] Coombs, Norman R.: History by Teleconferencing. History Microcomputer Review. 4(1), Spring 1988. pp 37-39

[7] Downing, Theodore E. et al: Improving Instructor/Student Interaction with Electronic Mail. Engineering Education. 78(4), Jan. 1988. pp 247-250

[8] Kinser, W. & Pear, J. J.: Computer-Aided Personalized System of Instruction for the Virtual

Classroom. Canadian J. of Educational Communication. 17(1), Winter 1988. pp 21-36

[9] Regev, Joseph: TPSA: Teaching of Thinking in a Computer Environment. in Proceedings of WCCE85. North Holland (1985) pp 271-275

[10] Phillips, Gerald M.; Schoolay, Larry; Mapz, Eileen; Nielson, Louis & Martinez, Ralph: The Use of Computer-Mediated Communication in Training Students in Group Problem-Solving and Decision-Making Techniques. American J. of Distance Education, 2(1), 1988. pp 38-51

[11] Regev, Joseph: FLUID/MASHOV - A CAI System Based on Games, Dialog and Feedback. J. of Computer Based Education, 7(1), Aug. 1980) pp 8-11

[12] Kinkead, Joyce: Computer Conversations: E-mail and Writing Instruction.College Composition and Communication. 38(3), Oct. 1987 pp. 337-341

[13] Kaye, Tony: Introducing Computer-Mediated Communication into a Distance Education System. Canadian J. of Educational Communication, 16(2), Spring 1987. pp 153-166

[14] Scrogan, Len: The Online Underworld. Classroom Computer Learning. 8(5), Feb. 1988. pp 58-60

[15] Paulsen, Morton F.: In Search of a Virtual School. Technological Horizons in Education. 15(5), Dec. 1987. pp 71-76

[16] Harte, David V.: The Search for 21st Century Mindware. Community, Technical and Junior College J., 58(2), Oct. 1987. pp 50-53

[17] Ervin, Gerard: GO FLEFO: An Electronic Network for the Foreign Language Profession. CALICO J., 5(4), Jun. 1988, pp 41-46

[18] Reinhold, Fran & Vernot, Dave: Online Information Services: You've Come a Long Way, Baby. Electronic Learning. 7(3), Nov. 1987. pp 36-38

[19] Lake, Dan: Moving Words. English J., 77(1),Jan. 1988. pp 83-85

[20] Regev, Joseph: The Disintegrating Computer-Using Class: Is it Really Inevitable. 1st International Jerusalem Convention on Education: Uniformity vs. Diversity in the Cybernetic Age. Jerusalem, Dec. 1984

[21] Regev, Joseph: Can Computers Teach Programming? in Lewis l.f. & Feinstein, b. (Eds.): Proceedings of ICCDE, International Conference on Courseware Design and Evaluation. Ramat-Gan, Israel, Apr. 1986. IPA, Ramat-Gan, Israel. pp. 294-303

[22] Skaggs, Peggy: Computerized Communication: Problems and Promises. Technical Writing Teacher. 9(3), Spring 1982. pp 163-167

THE INTEGRATED VIRTUAL LEARNING & WORKING PLACE

Mette Ringsted, Niels Christian Nielsen, DENMARK

Introduction

This paper will discuss a future for the professional, including his or her working environment, the company structure and technology but also a more general social setting.

The presentation at the ISTE conference will deal with organizational, pedagogical, technological and cultural issues and with the relation between local and global settings.

In these respects it will be based on very comprehensive experiences from distance learning, from industrial development projects, and from work related to the development of the role of professionals and their tools.

As an introduction to the presentation this paper establishes a more general introduction to convergent development trends, involving:

- company structure
- the integrated working environment
- the job integrated learning environment

and it goes into the question of how these changing needs can be implemented in systems design.

Company Structure

Development in production technology has weakened the dependency of production economy on scale. This again is changing the structure of industry and of organizations and company relations fundamentally.

The large corporations leave their ambitions of vertical and horizontal integration. Instead they seek and concentrate on their business focus - their competitive strongpoint; they enter pre-competitive co-operation even with their competitors in areas other than the business focus (fundamental research; advanced personnel training; major investments in development, for example major car manufacturers co-operating on the development of new engines); they split up production into smaller units which they try to optimize in terms of flexibility and closeness to markets; they enter business partnerships with a new type of subcontractors whom they do not squeeze on price closeness to markets; they enter business partnerships with a new type of subcontractors whom they do not squeeze on price but from whom they expect high quality, just-in-time delivery and active exchange of knowledge and information. In this changed corporate structure the communication system, computerized integration of processes and high capacity networks are essential factors of coherence.

Even though this development in principle is strictly internal within the corporation, it involves global networks and information systems in between companies, i.e. between main producer and subcontractor.

For the Small and Medium-sized Enterprise (SME) the new production technology means the ability to compete in terms of isolated production economy. In the same process, however, traditionally safe niches are exposed to competition from large companies, and the weaknesses of the small company in terms of management depth and lacking resources for administration, monitoring of markets, technology and competition, R & D, product development, quality assurance etc. become critical.

SMEs are seen to compensate these weaknesses by co-operating in networks where groups of SME's seek common solutions to common problems (jointly achieving critical mass in all the areas where each individual company is lacking in depth), developing mutual complementarity, and developing subcontractor relations of demand/knowledge exchange chains. By compensating their weaknesses in this way, SMEs can capatalize on their strength in flexibility and compete successfully with the best of the large companies.

Once again the information and communication system is of an essential impact, creating out of the very small company a virtual corporation.

The Integrated Working Environment

It is a well described historical development how mass industrialization tended to reduce jobs to monotonous, repetitive and - in terms of communication - isolated functions. In the early stages of computerization, this job structure was even reinforced, leaving millions of especially women in typing pools, and numerous other trivial data entry functions.

Professional jobs have always been characterized differently. For instance, the TIA project did an in-depth analysis of the work of engineers involved in product development. Conclusions were that this type of work is versatile - involving a large number of different activities, each with its own domain, its own rythm and timing - iterative and co-operative. The iterative character of professional work is a direct expression of its non-repetitive, even innovative nature, evolving in multi-dimensional trial-and-error cycles. Co-operation, of course, is a well-known fact of complex product development since such tasks are always undertaken in teams of specialists and their support staff. However, studies also demonstrate that the success and creativity of an engineer is directly dependent upon the extent of his communication with colleagues and professionals in other fields outside his immediate working environment.

Within the described development of company structure, we see a larger and larger proportion of all jobs displaying these same characteristics, versatility, iterativity and co-operativity. That is an inevitable consequence of the structure of the "virtual corporation".

For the further argument of this paper it is especially important to note that when jobs develop in this direction there is a convergence between the nature of work and the nature of learning. Among the functions in the versatile working environment is that of learning. Work is iterative because it is also learning. And the partners of communication, who are so essential to professional success, are - or could be - classmates in the virtual classroom.

Jobs involve learning. And education becomes on-the-job training.

The same development can be seen in technology: As the professional workstation becomes multi-media and is required to support versatility, interactivity and co-operativity, who can tell the difference between a work-station and a learner work-station?

The Job Integrated Learning Environment

The devlopment within further education tends to go from learning in an educational institution environment to an on-the-job integrated learning environment.

Also there is a tendency of moving from the physical classroom environment to a combination with a more virtual classroom environment, understood as an interactive learning and communiction space located in an electronic network.
The background for this development is the increasing need for long-term further education in SME's. Distance education can be a help solving that kind of problem. The possibilities of using new methods via integration of technology in the educational area and the job environment not only make distance learning easier and cheaper but also set new concepts.

Testing of various multi-media learning workstations in Denmark has revealed some changes around the learning process in a job environmental virtual classroom:

1. Dissolution of the concept of what a course is
   A change of:
   - course content
   - course material
   - extension of course time
   - pedagogic methods and integration of information technology

2. A change in student/teacher/learner roles

3. A change of attitude in the job environment.

1. When you move the learning process from an educational institution into a job integrated environment - the course does not need to have the same structure.

   a) When you learn on the job, a lot of the actual real life problems from the job can be an integrated part of the course content instead of abstract unknown problems from books. That goes for factual as well as problem solving elements of the courses.

   b) When you learn on the job a lot of the educational tools can be replaced by real life equipment.

   c) When you don't have to move from the job to an educational institution or congress center you do not have to learn everything squeezed together in one day, one weekend, one week because it is expensive to travel to receive education. You may as well extend the learning process over a longer period with time for learning and time for working/practising.

d) When you learn on the job and take advantage of information technology you can alternate between individual training, group learning and the multi-media virtual classroom.

The technical set-up we have been working with so far includes:

1. Traditional classroom sessions.

2. Group work with access to a dynamic text/image/sound database, electronically stored curriculum and training material, tools like word processing, spread sheets, cad programmes, robot programmes etc.

3. A real time videotelephone dialogue, where the teacher can draw, talk, point out text and images, show slides and so forth and where the participants can see each other.

4. An asynchronous communication using a first generation computer conferencing system, tying learners, teachers, tutors and course administration together in a network, where you can make the same structures as in a classroom.

We have learned that it is necessary to create a common overview giving the learners a feeling that they belong in the same virtual room, giving them a common point of reference. The electronic network can thus replace the physical walls of the classroom.

Also you have to pre-define some communication structures, some paths where you definately will meet the others. These paths can be a pre-organized set of communication habits, that the communicating parts have to acquire. But it could also be a part of the user interface in the communication system, if it is possible.

2. The possibilities of taking in new course contents and new methods of learning imply a change of roles in the participiping groups.

The teacher's role will include functions like consultancy, process catalyst, author, communication expert etc.

A lot of the traditional roles of a teacher will be moved to other areas or may be carried out partly by the computer, the students, a range of people. In this respect it is interesting to see that teamwork and interdisciplinary solutions become more common and appropriate according to the needs for education in the companies.

The teamwork can be formed as actual meetings, electronically shared development of course material. And the teacher can work in networks that are inter-institutional and geographically wide-spread, if needed.
3. By integrating the learning process in the work place you will have to take the company culture into consideration. This means that you have to consider the present level of technology as well.

Our experiences have underlined the fact that there is today a general lack of technology awareness and understanding in a broad sense in many Danish companies, even in companies that have implemented new production technology. If you were able to use, understand and be creative with computers on a broad basis in the companies, the pedagogic dimension would be another.

In a company with a fully automatized administration for example, you will meet the existing electronics infrastructures integrated in the organization. It will be much easier to establish a well functioning distance education here, among other things because of the technological awareness and understanding within the learner group.

On the other hand it is necessary for the companies and organizations involved in on-the-job training courses to reconsider their educational programme along with the implementation of new technology - be it either a small or a large scale company.

You should not reflect strictly upon educational matters but also take into account the communicational infrastructures in the organization and the educational situation from a technological point of view by integrating the technological strategies for production, administrative, organizational and educational purposes.

Most companies are not geared to life-long education, a fact that should absolutely not be forgotten. If the employees' knowledge is to correspond to the technological development, education has to be much more widely implemented than it is at present.

Implementing Changing Needs in Systems Design

The convergent development trends in company structures, working environment and education point towards new integrated technological solutions based on new, global, high-capacity networks.

Findings from several full-scale experiments have led to the concept of an integrated, distributed, multi-media and tailorable communication system which could be the prototype of such a solution.

The solution was conceived originally on the basis of experiments with the virtual classroom and on-the-job training but it has been refined after having been exposed to prototypes of a future professional working environment.

Due to the versatility of the professional working environment, the professional end-user is the user of up to 35 different software applications. This of course makes problems of difference in user interface syntax critical, right to the border of disqualifying computers as a rational and effective working tool.

As a response to this, generalized UIMS (User Interface Management Systems) solutions have been tested. However, results turned out to be negative. A common syntactical denominator for semantically and functionally different applications does not increase efficiency of use.

However, the very fact that professional work and learning processes are also fundamentally co-operative and hence communicative of nature led to the realization that the communication system is not of the same hierarchical order as other applications. As to domain and function, the content of the other applications is meant to be communicated. Functionally and semantically, the communication system has its meaning and content in the other applications.

This led to the assumption that the communication system is the common semantic denominator in a versatile application environment and hence that it is the prime and only candidate for the role of a syntactic denominator as well (UIMS).

Therefore, for the professional in the work or learning process_a system is conceivable which;

1. syntactically enables the mastery of a versatile application environment;

2. defines communication mode as home base and therefore corresponds to the co-operative nature of professional work and the learning process;

3. does not reduce versatility and is thus open to domain specific applications.

Furthermore, the concept and technological developments are open to tailorable user interfaces which means that new and dispersed organizations can be implemented in the system. And since remote communication and multi-media facilities are inherent in the concept, so is its adequacy to new modes of distance education, i.e. the virtual and global classroom.

The described concept has been the basic idea in the joint development proces of NJIT and DEUS (ATC and JTI), which in spring 1989 has resulted in the first product, the EIES 2 system.

EIES 2 is a distributed and decentralized computer-mediated communications system. The development of the system is based on a network philosophy and on the increased need within industrial and educational environments for a new generation of multi-faceted co-operative tools.

These tools must support improved organizational productivity by structuring and facilitating often complex communication processes. With EIES 2 this occurs within an electronic environment instead of by face-to-face meetings, telephone, fax or letters. An electronic co-operative working environment that meets the needs of tomorrow's organizations must therefore support facilities such as computer conferencing, electronic mail, decision-making tools, data collection and voting tools, integration with on-line services, integration with other applications, graphics and images, communication and information management. These are present and future possibilities of EIES 2.

A co-operative environment must typically deal with a large, diversified and also a dispersed group of users, often both nationally and internationally. One of the keywords therefore is inter-operability which has often been a problem in the structure of earlier systems. Another problem which a co-operative working environment must often face is the variety in computer facilities available. Within a large group of users some can typically be off-loading from a central mainframe, others will be using working group LAN connected systems, department mini computers or PC's. Whatever the environment might be, EIES 2 is designed to operate transparently so that the user does not have to worry about how the system is configured.

The functionality is now an integrated part of the communication structure of a national Danish network programme, where it is used to link network brokers with each other and with international experts, just as it will be a core communication system for many SMEs in network.
It is second generation user interface and communication tools in a multi-media experiment, organized as distance education between Denmark and Portugal; and it is the educational tool in many distance learning courses.

AT-RISK POPULATIONS--ON_LINE SOLUTIONS

Lynne Schrum, University of Oregon, U.S.A.

Our nation provides precious few forums which allow, let alone encourage, teenage citizens to address important social issues, particularly those problem issues that place adolescents and their families at-risk. Today, estimates of students classified as at-risk in the United States range from thirty-five to forty percent of those in K-12 classes.

Interpreting the problem is difficult, in part due to the complexity. Also, the numbers and explanations depend on who you ask or to which source you look. Drop-out rates, teen pregnancy, youth unemployment, juvenile crime...all have been used to measure at-risk. Antonia Stone, founder of New York's 'Playing to Win' community center, says, "an at-risk student would be someone whose needs are not being met by society and who is in danger, or at-risk, of not being able to lead a productive life"[1].. One could make the case that today, all adolescents, in every country, are at-risk in some way. The question becomes one of 'what may have a chance of engaging young people in active participation in their learning, and in their choices of lifestyle?'

In this paper I am going to describe three projects that have taken place in the last year. Using telecommunications, computer mediated conferences, and a variety of other communications, these three activities have connected youth around the United States, with the goal of encouraging them to address meaningful issues. These goals serve two educational purposes. First, they involve students in action about concerns that are part of their lives. Second, through the activities of using telecommunication, these youth are enhancing their involvement with their community and the larger world. They are learning in ways that may not have been possible before.

These three projects were not connected in any way, other than through my participation; yet, all began with two basic premises. The first premise is that learning must be placed within the context of students' lives to be meaningful. Therefore, curriculum emerges from student experiences, from issues prevalent within their communities, and from histories and knowledge pertinent to both. Many studies have identified students as passive, uncritical receivers of information, and disengaged from learning tasks. [2] This premise advocates active learning in which teachers and students, working together, attempt to understand the critical issues confronting them in their schools and communities. Such a pedagogy challenges a common assumption that young people are neither interested in nor capable of understanding complicated issues.[3]

---

[1] "Technology and the At-Risk Student". Electronic Learning. 8 (November/December 1988):35-49.

[2] Wehlage, Gary G. "Engagement, not Remediation or Higher Standards". in Children at Risk. ed. Joan M. Lakebrink. Springfield, Illinois: Charles C. Thomas, 1989.

The second premise is a belief that one way to empower youth is to respect their opinions as valuable, and that further, "...the chance to collaborate with peers in a non-competitive academic setting can be a positive experience as well" [4] Telecommunications offers specific opportunities for interaction, collaboration, and timeliness that other means, including use of a stand alone computer program, do not afford.

The projects I am going to discuss will demonstrate these two guiding principles, provide examples of feedback from the participants, and lead to some conclusions and implications for further activities involving each group of adolescents.

TEEN FORUM INFORMATION NETWORK
JOURNALISM AND THE TEEN PERSPECTIVE

I will begin by describing a project that seeks to establish a national demonstration model for effectively researching and communicating the views, values, concerns, and needs of a nation of at-risk adolescents. Further, this project will improve the awareness of a teen perspective among adults, expand the dialogue between teens and adults (including parents, politicians, media professionals, and policymakers), and empower adolescents with a greater sense of personal, social, and political effectiveness.

The Teen Information Network, which began about a year ago in Eugene, Oregon, has been successful in meeting their goals. They first produced a booklet, Teens Talk to Parents about Drugs, as a result of discussions with teens in the local community. Now, using telecommunications, they have expanded the scope of their program. There are sixteen charter sites that represent high schools in many geographic locations, a wide variety of student body demographics, and reflecting a national perspective.

In the last several months, we have concentrated on three main activities. First, a survey was taken at all the sites. Over 500 students were asked to rate the level of concern they personally felt about 22 issues. Next they were asked to allocate $100 billion between 30 programs that currently receive national funding. The results, as shown on graphs 1 and 2, indicate that these young people are aware of the serious issues that face the nation, and that personally affect their lives.

---

[3] Eisner, Elliot W. Cognition and Curriculum: A basis for Deciding what to Teach. New York: Longman Inc., 1982.; Davis, Lee and Lynne Schrum. "Interim Report: Homeless Project". unpublished manuscript. 1989.

[4] Bialo, Ellen R. and Jay P. Sivin. "Computers and At-Risk Youth: A Partial Solution to a Complex Problem". Classroom Computer Learning. 9 (January 1989):35-39

CHART ONE

TEEN FORUM INFORMATION NETWORK

RELATIVE IMPORTANCE OF MAJOR ISSUES

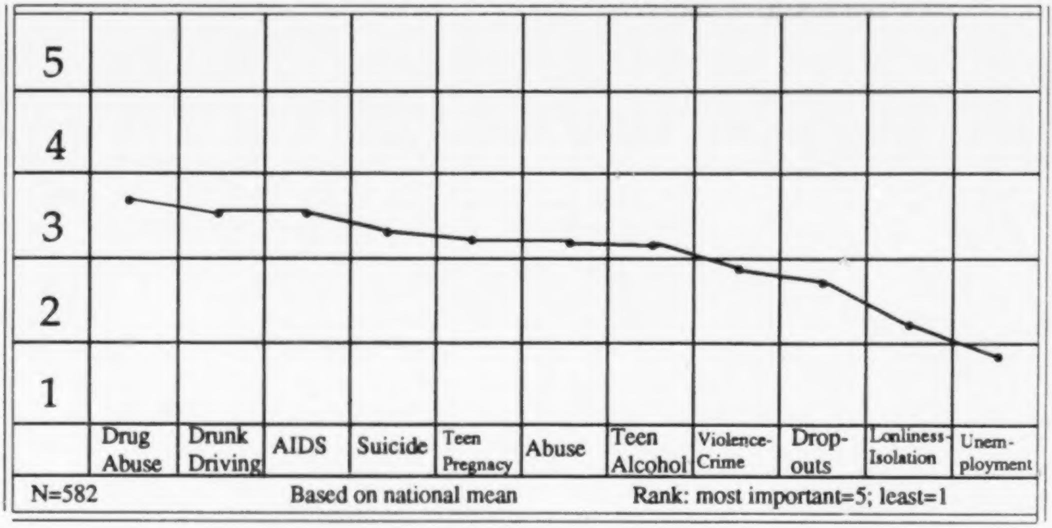
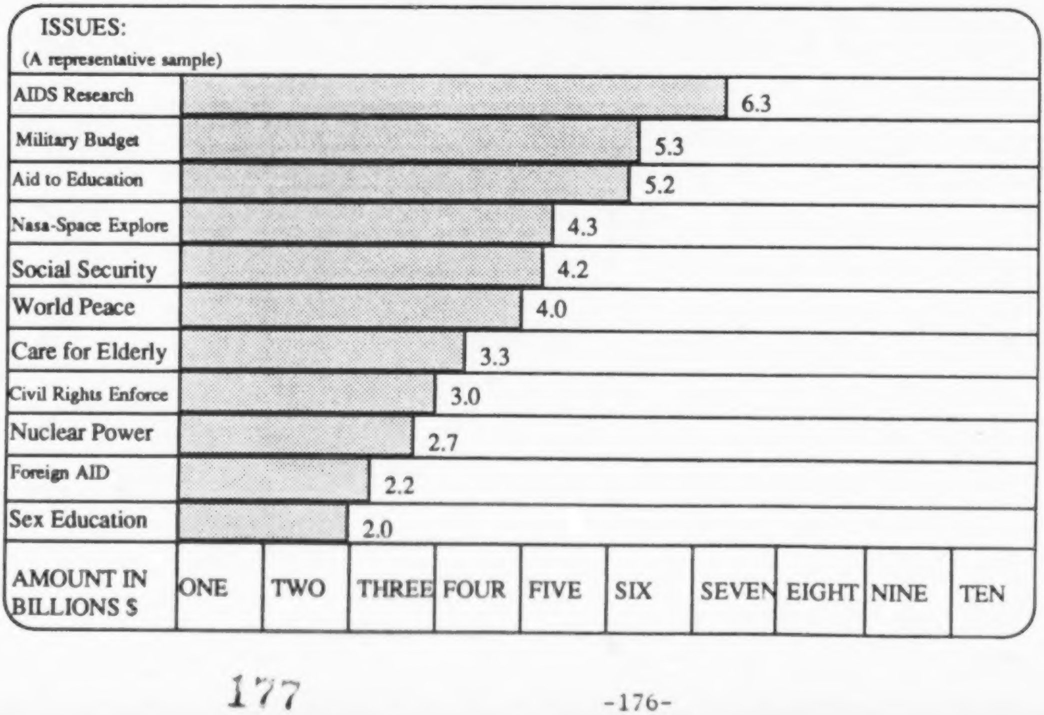


CHART TWO

HOW TEENS WOULD SPEND $100 BILLION FOR NATIONAL PRIORITIES



The youth that participated in this survey gave feedback on many of the questions. Craig Bryan, Program Director, talked about the results,

> "This is only a starting point to identify what areas they are interested in. I am impressed by the amount of thought the teens gave to this process. This indicates to me that they possess a deeper understanding of the issues than most adults give them credit for. Could we be missing a unique perspective by not listening to them or asking their help in dealing with these issues?"

The second activity has been the production of a national newsmagazine, Teens Talk to America. Students identified questions they wished to investigate. They became reporters and gathered, created, and wrote articles about problems that threaten millions of adolescents: drugs, abuse in the home, conflict with parents, and others. The students interacted across the country, and cooperatively produced this magazine. This first production, a prototype for one that will be regularly scheduled, has taught the students, their teachers, and the Teen Forum Foundation coordinators many things.

The students would like to take more responsibility for assembling the final product next time. It is probable that we may be able to rotate that process over the next school year. One other complaint concerned the size of the newsmagazine. Those involved all wished they had been able to produce something the size of an encyclopedia: everything that the students wrote turned out to be valuable and worthy of printing. That issue remains to be decided.

Our third goal was to complete telecommunication training in all the sites. This task has become the most difficult challenge of all. Most of the sites were identified, not on the basis of their expertise in technology, but because we felt strongly that it was more important to have perspectives from many different schools. Although the teachers and students have been highly motivated to learn, the problem of getting equipment set up, overcoming the technical glitches, and finding time to practice new skills in the midst of other teaching responsibilities have combined to slow down the process. I have become convinced that a face-to-face inservice program, specific to this subject, would have been far superior. In addition, had we been able, it would have been ideal to identify one support person in each location to help with the training.

DATANET AND TEEN.HEALTH: HEALTH ISSUES AND AT-RISK POPULATIONS

The second project I am going to discuss will continue to demonstrate empowering adolescents, specifically by encouraging them to take responsibility for their health and for decisions they make in this area. No longer are the primary threats the external forces of disease. Today, over three-fourths of deaths to adolescents stem from socio-behavioral causes. Teenage pregnancy, drug and alcohol abuse, stress and depression all have their origins in psychosocial, lifestyle, or environmental factors[5]. The causes of health problems among adolescents have become increasingly complex; personal choices, lifestyle decisions, the social forces of poverty and environment all have replaced the concerns of the past.

The Minnesota Department of Health and the University of Minnesota Adolescent Health Program were jointly awarded a four-year federal grant to develop a model adolescent health database for the State of Minnesota. As one part of that, a large scale adolescent health survey was undertaken in 1986-87 to gather comprehensive information from 36,000 teens. The survey focused on such topics as major worries and concerns of youth, body image, nutrition and eating behavior, sexual behavior and orientation, mental health, risk-taking behaviors, school performance and conduct, substance use, and relationships with family and friends.

The results yield rich information about attitudes, trends, teen knowledge of facts, and current practices. This database, used by state agencies and administrators, was not meaningful or readily accessible to a significant segment of the educational system--the students and the teachers. The Minnesota State Planning Agency decided to take this health related information and try to make it useful to the schools.

A four week pilot study was conducted to give teachers and students an opportunity to become familiar with, discuss implications, and utilize the information in the database. In addition, we had hopes that these people would be able to give feedback about some of their continuing concerns regarding this issue. On the McGraw Hill Information Exchange (MIX), we began a conference, teen.health, to explore exactly these topics.

The planning was accomplished by four people: two State Planning Agency employees, one University of Minnesota research investigator, and one MIX moderator. Our goal was to determine what interest exists, what questions students and teachers ask, what type of experts might be useful to the classes, and to observe the process of interaction that developed. We began one private conference, as a place to continue planning for the four of us.

The databases, which had been available via a gateway through MIX on a fee basis, were opened to all MIX participants. We began with one topic devoted to instructions for entering and using the database. We provided a description of the survey, how the sample was selected, and some information on the major findings. We also started one topic for discussions, to encourage completely unstructured interactions. And then, to help begin the discussions, we chose the topic of teen sexuality as a first topic.

It is important to emphasize that this project, unlike the others, was not designed for direct communication among students, but rather to give teachers information, provide a forum to discuss the issues, and then encourage sharing with their classes. The results are encouraging for two reasons. First, the teachers interacted in many ways with each other. The structured discussion on teen sexuality became an open forum and led to many teen questions. People seemed to want to discuss a wide range of issues: how and what to teach in a sex education course, the role of parents, adolescent questions about birth control. Questions about abortions were passed on to experts at the University of Minnesota Adolescent Health Center. It was obvious that the people responsible for guiding and teaching youth want more information!

---

[5] "The State of Adolescent Health in Minnesota". Federal Division of Maternal and Child Health, Grant #MCH273460. February 1989.

The second important result of this study suggests that students also want information to help them make intelligent decisions about their lives. One topic of concern focused on the data available about teen use of alcohol and its possible relation to deaths from traffic accidents. The survey had showed strongly that teen age boys tend to drink more alcohol and are more likely to drive after two drinks. Statistics from the department of motor vehicles show that two-thirds of the adolescent deaths are from motor vehicle accidents, and over 50% of them are alcohol related. I had the opportunity to observe one class when it learned that 77% of the youth that die in motor accidents are male. They began an animated discussion about the reasons boys might take more chances, and how they might have an impact in changing this tragedy.

Students in other classes decided to run their own surveys, in order to compare the results of their school to Minnesota. One school in Toronto discovered that, among the group polled, the major pressure on teens is from peers, in deciding clothing, drugs, and sex. Yet many students reported pressure from parents regarding school, grades, and their future careers. Competing norms and expectations seem to confuse many youth. They also discovered that there is less pressure to 'be cool' these days, and that the major concerns of the students are related to their grades and their future; however, the pressure to engage in sex was reported very strong among the males.

The young woman in Toronto who organized this survey, after sharing results with the members of the conference, summed up what she had learned this way:

> Teens today face problems that almost did not exist yesterday .
> surveys such as this creates awareness of the many adolescent
> issues concerning teens today. I hope that you have enjoyed
> this survey and in some way found it to be educational.
> Signing off !!!!!
> FARAH A.C of R.C.I

This project, although not directed at students, produced a great deal of interaction between teachers and students, among teachers and other school personnel, and gave a clear indication that current and relevant information engages students in active participation. It was fascinating to watch students and professionals interact as equals. Health issues play a significant role in all adolescent's lives; being at-risk is more than just the danger of dropping out of school. Teen health is an equally important topic that must continue to be addressed.

NEW YORK YOUTH NETWORK
CONTEMPORARY ISSUES ACROSS THE CONTINENT

One of the most exciting prospects for using telecommunications with students at-risk involves linking community centers and schools. There are several community groups around the country that have introduced computers to their participants; I am going to tell you about a program that facilitates communication between middle school students in Eugene, Oregon and a variety of centers in the East Harlem, New York area in discussions on issues of significant interest.

I was fortunate to work on this project with Dr. Seth Chaiklin, at the Institute for Learning Technologies at Columbia University. Dr. Chaiklin has had experience with the community based computer training and began to teach telecommunications. From the activities with which he has been involved, he has formulated three general principles to organize specific activities conducted at his centers:

- Think in terms of enrichment, not in terms of remediation.
- Computers have to be fit into educational activities, rather than make the activity fit the computer.
- Computers are a multi-purpose tool which can be used for many different educational functions and objectives.

In summary, Chaiklin says, "...it is important to develop solid educational programs that aim to develop existing skills further or to develop new skills, rather than to focus on deficits"[6]

This project began as a method to introduce the students in New York City to the concept of communicating with people in other parts of the country. There are three centers that are involved: Playing to Win, a community center that focuses on technology, staff development, and job training; The Door, a center where many types of computer activities take place, and Basic Skills Academy, for community members who wish to complete some segment of their education.

The class in Eugene Oregon is located at Shasta Middle School, in the Bethel School District. Although the school might fit a traditional middle school model, Tim Goss' class has adopted a cross-disciplinary thematic approach to education. This class had only recently begun to use telecommunications, but had become fascinated with the sharing and knowledge they had gained. When offered the opportunity to communicate with adolescents who live in 'the big Apple', they eagerly agreed. An ongoing project for Tim's class had been investigation of the homeless situation, locally and nationally. The class was eager to discover information about the the problem in New York City and to share what they had learned.

We began with introductions from each participant. The system in New York was arranged so that all of Eugene's messages, sent via BIT-NET, were posted on an open bulletin board. I was concerned that this might slow down personal identification or diminish a sense of ownership by the students. I also wondered if the disparity of the students ages would dissuade the older New York students from communicating.

---

[6] Chaiklin, Seth. "Using Computers in Community Educational Programs". Computers in Human Services. in print.

I need not have worried. The adolescents in all three of the centers appear to have identified strongly with the students in Eugene. Maps and postcards have been exchanged. As the school year ends in Oregon, the New York group has begun to ask for personal penpals to continue. It appears that the class in Eugene, and the classes at the community centers have made a connection. Victor, a Eugene student, said, "I thought all the kids in New York would be drug addicts and that it would be very dangerous to live there. Now I know they are just like us in lots of ways, and I have learned a lot. I would really like to visit them."

The nature of the communication has been limited by some hardware problems, and with the differing schedules of the groups. There have been a few slow times, when exchanges have stopped for several days. In spite of the difficulties, the students in Eugene feel that they have learned a great deal. The New York students have a sense of what Oregon is like, how these students view the homeless situation and the kind of activity they have been able to generate, and have even made requests for personal letter exchanges after the school year has ended.

This project has convinced me of one major rule about any telecommunications project. If too little structure and guidance is provided, students flounder and are uncertain how to proceed. On the other hand, if there is too much structure, too much imposed curriculum, the students do not have ownership and do not help drive the process. Striking just the right balance between the two take a delicate hand.

In conclusion, these three telecommunication projects are accomplishing goals of engaging adolescents in meaningful dialogue with peers. They are meeting educational, social, and community goals at the same time. In addition, they are allowed to make a contribution to themselves and to the world in which they live. All our youth have to be challenged with activities that are important to them; at-risk youth may need an opportunity to participate even more.

It would appear that there is a need for further research and demonstration projects that attempt to look at different models of participation. Community to school, university and schools with city facilities, and others all are potential sources to assist youth in becoming adults and members of a society. One city, Seattle, has formulated a Policy Plan for Children and Youth, a youth charter that looks to young people as a community resource, rather than as a liability[7]. Perhaps, as the first step, this is a way to show that youth are their communities value them.

---

[7] Ianni, Francis A. "Providing a Structure for Adolescent Development". Kappan. 70 (May 1989): 673-682.

FIRST OF ALL, LOCAL NETWORKS

Richard Shor, The Schomria Secondary School, ISRAEL

Introduction

Much work has been done to develop the use of telecommunications technology in schools, exploiting current computer resources for information retrieval in an attempt to improve the scope and relevance of the learning process [1]. The proposed uses of available telecommunication technology and suggestions to establish wide area networks to deal with educational needs are to be praised. However, in many cases the installation of such networks and the adoption of their use will pre-empt proper development of computerized information exchange within the school. To effectively lay the groundwork for these future applications, the educator's first priorities should be to link in-school resources and to train teachers and students in using an information retrieval and exchange environment.

Looking at the proposed uses of telecommunications in the schools, it is possible to identify several main themes. The task of this paper is to demonstrate that all or most of these activities can be realized within the confines of the school by installing a Local Area Network (LAN), and that this LAN will greatly improve the effectiveness of any wide-area telecommunications system used in conjunction with it.

Telecommunications Goals and the School

The ultimate goal of any telecommunications system is the quick and efficient distribution of resources among its users. These resources may take several forms:

1) information in databases which is relevant to at least part of the user base,
2) software,
3) public notices initiated by users, in conferences and otherwise,
4) private notices intended for specific users.

These notices can be looked upon as a sort of knowledge base. In addition, some systems provide the ability to execute transactions interactively, such as the electronic funds transfer found in consumer oriented environments.

The rationale behind linking a school into such a system is to open the institution up to extensive resources not found within its walls. There are several difficulties at present which must be overcome in order to realize these expectations.

Few systems that provide resources of an educational nature exist, and of these, even fewer are directed specifically at the student-teacher population. Although there will, surely, be much progress in this area in the near future, most educators and students do not know how to use computerized communications systems or what they are capable of providing. The cost of accessing remote databases may be exorbitant in monetary terms and high in the amount of computer time needed for a large number of people to learn what a system can provide and how to utilize it [2].

The Current Situation

There are many unexploited "soft" resources in the typical school. These may be works of references, lists of ideas and projects, explanation and exercise sheets on different topics, catalogs, software, and the untapped minds of students and teachers alike. If you are a student you must know how to look, where to look, and who to ask for help in finding something. Resources (including computer resources) are usually localized according to discipline, intended audience, or the person responsible for them. In an extreme case, the organization of such resources may be minimal (or random!), and there may be no way of knowing just what sort of tools and information are available.

The services provided by school bulletin boards and mailboxes are often untidy, undependable, and limited in the type of information that can be exchanged through their use. Other operations performed by the school administration are incomplete and inefficient, involving the manipulation of much information stored in many different forms . Operations performed by the teaching staff, such as ordering goods, signing-up for equipment and special rooms, and others, must be done at specific sites and at limited times. The situation begs for computerization. Unfortunately, the strategy chosen to implement computers in the school is, in most cases, hardly able to cope with this range of problems.

Today's school microcomputer is typically unable to communicate with other microcomputers or access remote databases. Most are used as independent stations for educational software (including some educationally worthwhile applications from the programming and office environments) relying on diskettes or local hard-disks for programs and data, and on diskettes for data exchange. These methods are inefficient and take little advantage of the power of the microcomputer in the educational environment. Geographical boundaries are established within the school, which impede the dissemination of information of educational or instructional value. Some sort of connected computer system is necessary to allow students and teachers to transparently use software and to exchange data and messages between one another, to and from different sites in the school. One possible solution is the Local Area Network [3].

The Local Area Network [4, 5]

In a LAN, microcomputers are hard-wired together in varying topologies, be it star, bus, tree, or ring. This generally requires special hardware, although there are exceptions [6]. One or more microcomputers are defined as file servers and print servers. The network's software provides all the necessary functions that enable an individual microcomputer to perform file handling and printing tasks, via the network servers, as if it were directly connected to a large hard disk and other peripheral equipment, while also providing accesss to shared files. Other software functions include fault diagnosis, security, electronic mail, real-time message sending, "screen grabbing", and print queuing.

The LAN allows very high speed, transparent data exchange among the connected microcomputers, generally on the order of one hundred to one thousand times as fast as today's accepted telecommunications medium, the voice telephone line. This high speed makes it practical and desirable to distribute processing power to the individual computer by loading the necessary software at the beginning of a session [7], subsequently calling on the server only for data I/O. This strategy frees the server for other tasks, and makes it possible to run applications which are both data and processor intensive, such as graphics, while still connected online to a common database.

In fact the only facets of telecommunications that the LAN does not provide are distant communications and experience with the technical tricks (or "black art") of the trade. Distance educational telecommunications projects do have many advantages, including the potential to motivate students and teachers, because of the apparently limitless resources to be taken advantage of, and because of the possibilities of sharing and communicating with other cultures [8, 9]. The LAN will not be able to provide these incentives on the same scale. However, the transparency provided on a LAN isolates a user from the problems concerning protocols, modem speeds, file compression and decompression, bad telephone lines, the use of a specific piece of telecommunications software, and the like. These are subjects and skills must be mastered today and, hopefully, will be unnecessary tomorrow. The study of these technical aspects is only the means to an end in the pursuit of the goals discussed above, under the limitations of present telecommunications technology.

The LAN in the Service of Telecommunications

Modern LANs provide the option of remote operation and also provide modem sharing among their users. This means that all the microcomputers in a given network installation can share a number of telephone lines for initiating telecommunications with the outside world, from within the laboratory, classroom, library, or wherever else the computer may be located. Teaching modes, in which the screen of one computer is displayed on others, allow other students at other computers to be partners to the communications transactions and to learn the techniques necessary for telecommunications.

It should also be a trivial task to implement a "telecommunications simulator" on a LAN to provide the technical, but necessary, expertise needed to go on-line to a distant database. (This is analogous to taking your first driving lesson in a nearby parking lot before challenging an eight-lane expressway.) In addition, some databases can today be purchased on CD-ROM and connected to the LAN. This alternative may be economically more viable than going on line, if it is possible to define in advance the types of information to which the school needs access [10].

Conclusion

Computer educators should continue with plans to build wide area networks of schools and the appropriate databases to service the needs of the student and teacher in a age of expanding telecommunications innovation. There is great potential in these projects to motivate the school population and to improve the interest, relevancy, and efficiency of the learning process. The individual school, however, should not be neglected; it has its own resources to offer and its own needs to provide for. These resources can best be distributed and the needs best tended to by installing a local area network which connects all the school's microcomputers. The LAN will be a training ground for telecommunications technology use and will help integrate the entire school population into an organic, worldwide educational environment.

Notes and References

1. Goldberg, Fred, "Telecommunications in the Classroom: Where We've Been and Where We Should Be Going." An excellent discussion of telecommunications potential in the educational environment, in *The Computing Teacher*, May, 1988.

2. "Telecommunications Planning Guide for Educators." An appraisal of telecommunications needs and costs (in the U.S.A.) in 1988, published by the McGraw-Hill Information Exchange, 9855 W.78th St., Eden Prairie, MN 55344.

3. Shor, Richard, "The Educational Importance of Local Area Networks in the Secondary School", *Computers and Education*, in press.

4. Lefkon, D., "A LAN Primer." An introduction to LAN technology, in *BYTE*, July, 1987.

5. Myers, Ware, "Toward a Local Network Standard." A technical description of LAN standards, in *IEEE Micro*, August 1982.

6. The Apple Macintosh, for example, has a built-in interface to the "Appletalk" LAN. However, this system is somewhat slow by modern LAN standards, communicating at less than 400 kbits/second.

7. This session may be part of a larger process, such as a program overlay, but the principle is the same. Since program files are transferred to user stations in relatively short "spurts" which are distributed randomly in time depending on the process, the file server can usually service a requesting station for data. On the other hand, some network software allows the option of performing data processing (such as the copying of files, when there is no updating to be done by the process) on the server itself, thereby easing the traffic on the medium.

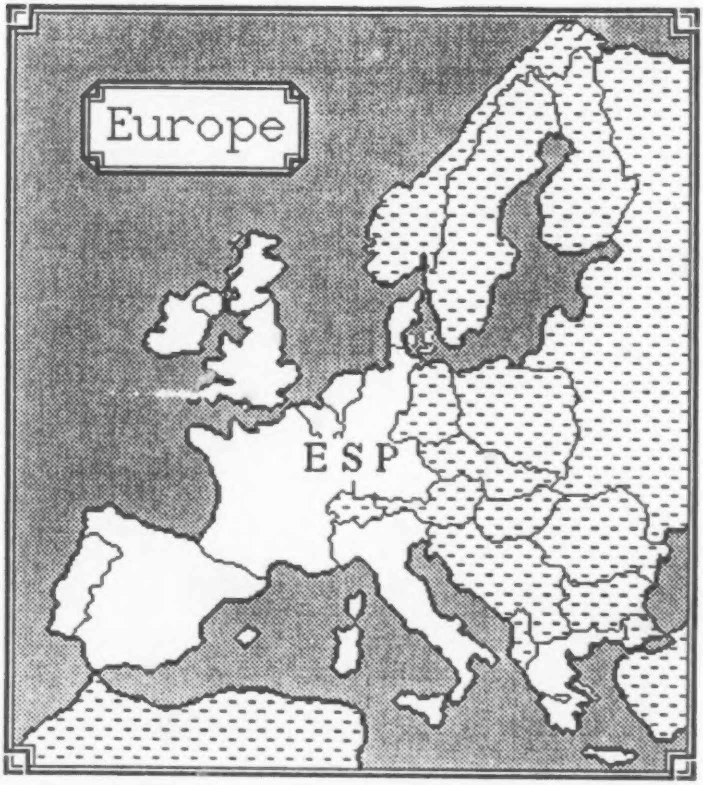
8. Rogers, Al, *FrEdMail Network and Functional Learning Environments, the FrEdMail Project, San Diego County Office of Education, April 1986.*

9. Cohen, Moshe and Miyake, Naomi, "A worldwide intercultural network: exploring electronic messaging for instruction", *Instructional Science*, Volume 15, 1986.

10. Plati, Thomas, "Using High-Tech Tools For Student Research." An account of student use of both on-line and CD-ROM use, in *Media & Methods*, May/June, 1988.

EUROPEAN SCHOOL PROJECT (ESP), TELETRIPS IN EUROPEAN CONTEXT

Henk Sligte, University of Amsterdam, The Netherlands



Abstract

A teletrip is an example of the anthropocentric use of telematics in regular secondary education. In designing and conducting teletrips emphasis is put on the facilitation of computer mediated conversations, not merely on enabling communications. In view of the coming step towards the unification of Europe in 1992 it seemed relevant to design a project in which new technologies are used to prepare pupils in the various countries to the new situation, and in which research and development are integral parts.
The European Schools Project (ESP) is aimed towards the creation of a dodecagon of schools, one school in every member-state of the E.E, in which teletrips are supported. Because of the practical problems to be solved a generic model is used to guide proliferation. Progress on the first European Triangle is reported, while next phases are sketched. As a Leitmotiv of the project the improving of education as a system and the activities of actors

within and with the system is stressed, using specific conceptual applications of NICT.

The concept of Teletrip

Applications of telematics begin to enter contemporary regular education. Teletrips involving schools in various countries are examples of these applications. A teletrip is a combination of local research activities of pupils around a certain topic, supported by various teachers from various disciplines, and global exchanges of results with other sites, using electronic mail. A teletrip is a specific elaboration of what one refers to nowadays as collaborative distance learning. Following Conversation Theory (Pask, 1975) learning results from interactions among participants or perspectives which lead through a process of mutual agreement and disagreement to concept sharing and understanding. This viewpoint lies at the heart of the concept of Teletrip.

Early 1988 a two-and-a-half months pilot project was conducted with schools in Amsterdam, the Netherlands, and British Columbia, Canada. In total 80 pupils in the ages of 14 to 17 years old were involved in electronic conversations about all kinds of aspects of their own environment, like history, recreation, town planning, etc. The interactions were enabled by implementing a classroom teleport, a personal computer with built-in modem, with which pupils could access the international datanets. The Canadian end was supported by Kathleen Forsythe, who had previous experiences with this type of communication-based-education (Forsythe & Wedder, 1988). The project was supported at the Amsterdam end by teachers in geography, English language and informatics and by research and development activities of the University of Amsterdam. From the project experience and expertise was gained on the anthropocentric use of technology facilitating both the acquiring of new skills relevant to computer mediated conversations and the improvement of traditional educational environments (Sligte, 1989).

The anthropocentricity expresses itself in the direct relationship of the project with the curriculum, the bottom-up mutual design and planning process of the teachers involved, facilitated by electronic mail, and the focus on meaningful human interactions of pupils grounded in real-world experiences, mediated by technology.
Elementary is the combined introduction of both new technological and new conceptual elements within the school's context with which various important features of good education can be realized, like multi-disciplinary, project-like, intercultural, multi-medium education, while discovery learning and integrated applied informatics/telematics education is tightly woven into the project.

Improving education

Teletrips have the potency of gradually transforming traditional educational environments into more user-dominant information environments. As is well-known from experiences and research (e.g. Goodlad, 1984) the educational environments within secondary education can be characterized by interactions in which the teacher is the main actor, talking most of the time, controlling, nurturing knowledge and feeding skills, while pupils are passive and consuming.

The environment can be described as a system-dominant protective environment. Applications of technology still often are fitted into this framework, consolidating or even reinforcing the interaction pattern (Sligte, 1986).

Because of the variety that is introduced from outside into the classroom when conducting a teletrip, variety that can only be controlled in advance in a very limited way, the traditional interaction pattern is not easy to be maintained. To be able to respond to questions or adjust to information from other contexts, the necessary preparations are likely to take place in cooperative pupil task-groups. Teachers can't suffice with a position in front of the class as a whole, but have to supply various types of support. Their traditional role transforms towards an intermediary in interaction, living database, and pointer to resources. Because of the fact the necessary knowledge is not only resident in the teacher's head or in the books s/he normally bases education on, new resources will be part of the educational environment, like encyclopedia, other institutions, persons to consult, etc. (De Zeeuw, 1985).

Also there is a tendency towards the lateralisation of knowledge. Often topics are treated within certain disciplines only, in isolation of other disciplines. Within a teletrip, where teachers from several disciplines support the same group of pupils, the vertical structure is slightly horizontalized, while as a side-effect teachers tend to find themselves in learning situations, both at the level of the use of technology and more important at the level of combining and fertilizing isolated disciplinary knowledge and didactic know-how.

As a magic word for the various aspects of teletripping, we might use connectivity. Both at the level of pupils, who cooperate locally and communicate globally, at the level of teachers, who have the possibility to decrease their isolation, and at the level of the knowledge and skills involved embedded in a real-world context, we see new connections meaningful to the educational process. This picture might preview a new way of learning and teaching (Snyder et al, 1986).

All in all the experiences led to the pursuit of further elaborating the concept of teletrip within secondary education. A major point is the question whether the Hawthorne-effect is in itself the only reason for the observed alterations in both the educational environment and the attitude of actors within and towards the environment and other actors. If so, the question arises how to keep on propelling newness in order to produce desirable more user-friendly learning environments. But of course it is more important to find out how to stabilize new interaction patterns without extincting the dynamics of human communications and without forgetting the societal task of the educational system with respect to its users.

Teletrips in Europe

One of the possibilities of organizing teletrips occurs at European level. The coming changes in 1992 when the unification of Europe will meet another step in its progress, promises a sound context for the promotion of transnational learning and exchange activities. Also in this respect we can use the magic word connections.

If Europe in future indeed is to be a United Europe, connections have to be made. Connections not only at the level of politics and economics, but also at the level of all-day-life and local culture. In direct interactions pupils can "talk" with their colleagues from other countries about differences and resemblances, leading to transcultural understanding. In this way teletrips can contribute to the diminishing of prejudices present in Europe, prejudices that can be noticed from chauvinist attitudes or historical labeling.

As teletrips are firmly embedded in curriculum, new angles to old problems can be introduced. Not in the last place the language aspects are very interesting. Because of the fact E-mail is a combination of telephone and letter new possibilities for communicative language learning arise. If one would have to use the telephone to talk to peers in another language severe problems would occur. Writing messages using a word processor allow corrections from language teachers, while the communication remains far swifter than in the case of "snail"-mail. The language curriculum itself is fertilized with new meaningful features.

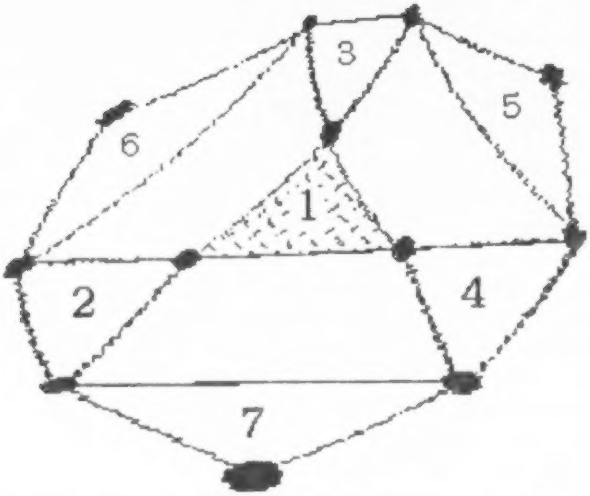
The European Schools Project is designed to provide a framework for participating schools to organize mutual teletrips in which the focus is on real electronic interactions between real people about real topics. From the research point of view ample possibilities are created to systematize the anecdotic level of previous experiences, in order to develop hypothesis and theories, and to promote the portability of the concept to every interested school.

Of course every project has to start somewhere. At the level of support it is investigated whether the technology programmes of the E.E.C. can fund parts of the project, while possible cooperation with PLUTO (Project to Link Universities and Teaching Organizations) is being discussed. National and European industries expressed interest in supporting ESP. As ESP is a fairly cheap project, chances of covering all costs are good.

At the concrete level the first step towards the construction of the European dodecagon by 1992 is set: the first European Triangle is conducting its first Teletrip in the months April up to June 1989. At ISTE full report about the findings will be presented. Here in the paper I sketch the outlines and the details of the design phase.

The first European triangle

Constructing a dodecagon of schools at once is not at all easy. Within the ESP a generic model is developed in which triangles are the building blocks for larger structures, and in which expertise is transferred along the lines of a snowball-procedure. Starting with one triangle every angular point acts as a cornerstone for a next triangle with two new schools (see the drawing at the next page). So starting with one triangle in 1989, three new triangles (2,3,4) will operate by the spring of 1990, followed by three more (5,6,7) by the end of 1990. Once schools have been part of a triangle two hexagons will be created by 1991. Especially the complex dynamics of the interactions will be subject to thorough observation in order to anticipate the scenario for the dodecagon in 1992 as good as possible.



The first European Triangle consists of the following schools. In Amsterdam, the Netherlands we have the Augustinus College, the only experienced school, participating in the Teletrip with British Columbia mentioned earlier, the Swadelands School in Kent, United Kingdom, and the Gymnasium Grossburgwedel, near Hannover in the Bundesrepublik Deutschland.

At the end of January 1989 teachers of the three schools were involved in a face-to-face conference to plan the teletrip, a meeting that was possible because of the relative limited distance. Of course planning can be done electronically completely, but because of the fact E-mail is a relative small-channeled medium, we preferred to have one real initial meeting. The following was decided upon.

The first teletrip is called TELE, recursive acronym for Teletrip European Local Environments. The topic is Ecology, and will be supported by teachers from the disciplines Geography, Biology, English language, German language, Dutch language and Informatics. The trip starts by April 1, 1989 and will take the participants into June.

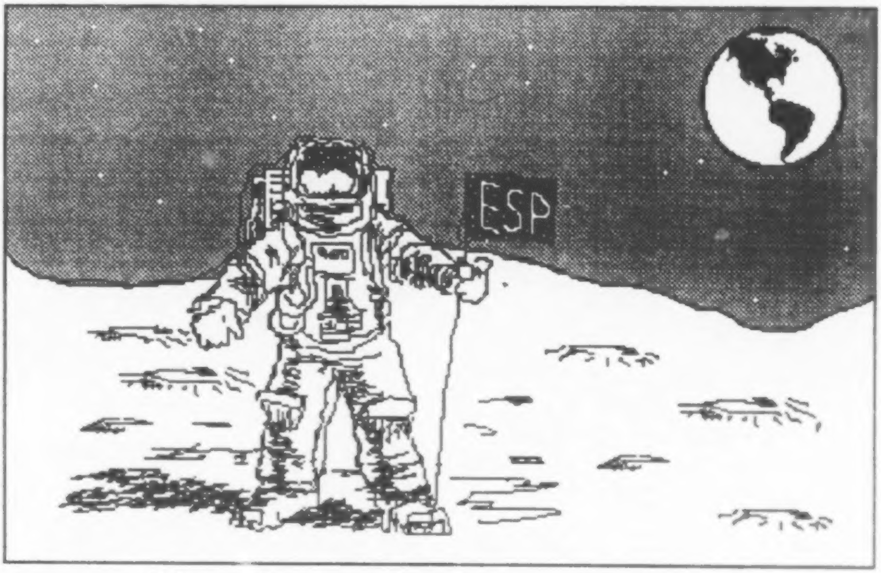
At the moment of writing this paper each site is preparing a scenario and a curricular outline for the project. These scenarios are distributed via electronic mail, and subsequently discussed. The major point here is to coordinate the decomposition of the topic into subjects that can be handled by cooperative pupil task groups, to synchronize the watches in order to guarantee limited turnaround times for answers to questions or reactions to information, and to phase the time-tables. Also technical problems are solved.

At the moment contacts are prepared for next triangles, in Denmark, Italy, Portugal, and Belgium. I invite everyone present at ISTE to point to suitable schools to participate in next triangles.

Conclusions

We should not exaggerate the importance of the specific use of this application of new information and communication technology for secondary education. It seems however that teletrips have enough interesting features to include them in the normal repertoire of schools.

The conceptual and technical infrastructure that is represented by conducting teletrips can also be connected to new meaningful possibilities to make schools more up-to-date to the challenges of our time and of the future. We could think of electronic homework support and correction, information resources at a distance, including other institutions like future employers or universities in parts of the education, or the consultation of experts about certain topics, allowing other users than pupils, e.g. parents, etc..It seems that certain conceptual elaborations of telematics can give a kick into the right direction of the evolution of the institutional educational system towards a more open social support system (Pask, 1987).



"Never knew school was so exciting"

References

Forsythe, Kathleen & Wedder, Candace (1988). Communication Based Education: Open Learning for the Classroom. In: Collins, J.H., Estes, N. & Walker, D. (eds.). The Fifth International Conference on Technology and Education. Edinburgh: CEP Consultants Ltd.

Goodlad, John I. (1984). A place called school. New York: MacGraw-Hill.

Pask, Gordon (1975). Conversation, Cognition and Learning. Amsterdam: Elsevier.

Pask, Gordon (1987). Conversation & Support. Inaugural address University of Amsterdam. Amsterdam: SCO.

Sligte, H.W. (1986). Information technology and adult basic education in the Netherlands. Bulletin Leren Van Volwassenen, nr. 15, pages 41-51

Sligte, Henk (1987), A glimpse in the kitchen of educational design. In Bulletin Leren van Volwassenen, 20, pp. 105-124.

Sligte, Henk (1989), Propelling Interaction Through Telematics. In: Tucker, R.N. (ed.) (1989), Interactive Media: The Human Issues, London: Kogan Page.

Snyder, Tom & Jane Palmer (1986), In search of the most amazing thing, Reading, Mass.: Addison-Wesley.

Zeeuw, G. de (1985), Problems of increasing competence. Systems Research, 2/1, pp. 13-19.

TELECOMMUNICATIONS: A TOOL FOR RECONNECTING KIDS WITH SOCIETY

Margaret Riel, AT&T Long Distance Learning Network, U.S.A

> As societies become more complex in structure and resources, the need of formal or intentional teaching and learning increases. As formal teaching and training grows in extent, there is a danger of creating an undesirable split between the experience gained in more direct associations and what is acquired in school. *This danger was never greater than at the present time*, on account of the rapid growth in the last few centuries of knowledge and technical modes of skill. (Dewey, 1916:p. 9 [Italics added])

Dewey was concerned about the direction of education at the turn of the last century. He worried that current schooling practices relied too heavily on books and lectures and not enough on "conjoint activities" so that students may acquire "a social sense of their powers and of the materials and appliances used."

His solution to this problem was to propose using the tools of the adult society in educational settings in ways that modelled the activity of adults. A printing press, a weaving loom, construction tools, and farming equipment could help students acquire academic skills in the context of their use. He was not advocating vocational training, but instead placing skill instruction with a context that *makes clear* the need for conventions, standards or levels of precision. Students learn from the consequence of their errors. His solutions was unworkable with the technology of the past. Machinery was expensive, space consuming, dangerous and fragile.

Dewey's fears have been realized. Schools have become places where students practice sub-skills over and over again, often with little understanding of how they will fit into an over all pattern of skill development. Teachers who construct these sequences of drills ask students for their blind trust; students frequently respond with bored attention. The result is too often decontextualized learning which does not transfer to settings outside of school. High school graduates leave school unable to complete applications, address letters, design a budget or read maps.

Now, as we approach the turn of the next century, technology gives new life to the ideas of Dewey. Computer technology provides a tool of the trades that can be successfully imported into the classroom. A computer is relatively inexpensive compared to a printing press or a weaving loom, flexible enough to model many different types of machines, and safe and durable enough to withstand use by young children. The communication possibilities of computers offer a new strategy for social interactions that extend beyond the classroom walls.

World Class Learning

Not only are computers changing what happens within classrooms, but they are opening up the classroom walls. Teachers and students who have been isolated in classrooms can now take regular excursions into a realm of new experiences. Computer networks provide a communication tool for reconnecting students to all sectors of the society. In the 21st century students may learn by using the tools of adult society and and by participating in the "conjoint activity" that Dewey recommended.

But technology alone will not change students (Mehan, Moll and Riel 1985, Mehan 1989). However impressive these new inventions, there is little evidence that computers, in and of themselves, lead to improved learning Computers alone can not teach students to read, cannot transform unskilled writers into skilled ones, cannot make students into skilled problem solvers. However, computers can create a new social organization for learning within and outside of the classroom. Computer networking may create new participants in the education enterprise (Levin & Cohen 1985). Students may work with, and learn from, reporters, writers, manufacturers, bankers, investors, doctors, scientists, engineers and cooks without every leaving the classroom or the careful supervision of their teacher.

This paper is about new social organization of learning that has resulted from introducing computer networks in classrooms. It is about how "conjoint activities" modeled on adult activity, lead to academic success. The results of three research projects, one each at the elementary, at the middle and at the high school level, all show the same effect: writing in the context of meaningful projects leads to skill development that is higher than is achieved with routine drill and practice methods.

The Computer Chronicles Newswire and 4th Grade Students in California

The availability of a computer in a fourth grade classroom facilitated a new social organization for reading and writing. The teachers organized their reading, writing and grammar instructions around a newspaper-writing activity and newswire service supported by the computer (Levin, Riel, Boruta & Rowe 1984; Mehan, Riel & Miller-Souviney 1984; Riel 1985). The teachers introduced a student newswire service known as the "Computer Chronicles" in their classrooms. Students from the project classroom joined with students in other parts of California, Alaska and Hawaii to share information. Each classroom published their local editions of the Computer Chronicles Newspaper carrying stories from their distant reporters.

The Computer Chronicles project helped the teachers establish learning environments which were organized for communicative purposes and not just as an exercise for teachers to evaluate. The presence of an audience for writing, in the form of classmates, parents and peers in distant locations, was a crucial ingredient in giving students a purpose for writing. This *writing for a purpose* and not writing for the teacher or practicing writing on the computer, subordinated students' concern for the mechanics of writing to the goal of communicating clearly. The public nature of writing provided motivation for re-writing and editing, giving students increased knowledge of word processing and control over the composing process.

The fourth grade students who participated in writing for the newswire and creating their own classroom newspaper improved their reading and writing skills well beyond grade level expectations. The students gained, on the average, 3 grade levels in language mechanics and 2 grade levels in language expression on the annual Comprehensive Test of Basic Skills (CTBS) (See figure 1).

Classroom observations suggested that the increase in students' learning was the result of their efforts at editing the work of *other* students rather than from editing their own errors. Editing their peers' writing increased the students' confidence since it is often easier to locate the errors of others than one's own. Students found it easier to develop evaluative frameworks to apply to the work of others than to judge their own work. The criteria they established helped them gain a new perspective on their own writing.

While all students in the classroom wrote articles for the newswire, a smaller number of students volunteered to serve on an editorial board to evaluate and select articles from the newswire for their publication. To further explore the idea that evaluating the work of other students may be a crucial variable contributing to student learning on this project, we compared the CTBS scores of the students on the first editorial board with those of the whole class. This group would have had the most writing experiences after serving as editors. These students' gains were similar to the class with one dramatic exception. They gained almost 4 grade levels in language mechanics (Figure 2).

Is it really impossible for students to learn four years worth of language mechanics in a single year? The answer to this question changes the focus. It takes four years to teach one year of language conventions when these skills are taught out of the context of purposeful writing.

The changes that we saw in learning in this classroom cannot be linked causally to a computer. They were the effects of a functional learning environment by a skilled teacher who had some experience in working with computers. The teacher used the computer to create a new context for teacher writing. The students did not just practice writing. They used the skill of writing to communicate their ideas with others who were separated from them in time and space.

Writing, editing and publishing their newspaper was far from boring, it was serious work. Students had a goal that they wanted to accomplish and the teacher was became a resource who could help them. Functional learning environments embed skill development within a task that students set for themselves (Newman 1984). Skill practice is placed in context and is driven by skill performance (Souviney & Miller-Souviney 1987).

The InterCultural Learning Network and 6th Grade Students in Alaska

Similar findings are reported in a second study in which students shared writing on an electronic network. The InterCultural Learning Network was a research project designed to extend the learning that we had seen on the newswire and newspaper writing project into other areas of the curriculum. The project brought together students from Mexico, Japan, Israel and Puerto Rico and from Hawaii, California, Alaska, Illinois, and Connecticut in the U.S. in an electronic forum to explore a range of social and scientific topics (Cohen and Miyake, 1986; Levin, Riel, Miyake, & Cohen, 1987; Riel 1987;1988). The classroom teacher in Juneau, Alaska, Caroline Garland, sought to document the changes that she could see in her students skills as a result of their work on the InterCultural Learning Network. She used the SRA standardized tests administered by their school district to compare her sixth graders who participated on the network with another 6th grade classroom who did not have this experience. To control for the difference in teachers, she also compared her networking students to a sixth grade class that she had taught the previous year without this experience.

Table 1 shows that test results for these three classrooms. Her students who exchanged writing on the InterCultural Learning Network made gains of almost 2 years above grade level in reading comprehension and 1.5 years in reading vocabulary. The gains in writing averaged 1.5 years above grade level. The test results for the students in the comparison classroom remained within a few months on either side of grade level expectations.

Computers and computer networks helped to create writing situations that were similar to those of professionals in our society. These students wrote to communicate their ideas with distant audiences--others who would read their work for its content and ideas. The use of standard writing conventions becomes clear when students had difficulty understanding the ideas of others who fail to use them. When students work together to create evaluative standards for judging the work of others, they internalize the standard and apply them to their own writing while they are composing. The reciprocal relationship between the writer's message and the reader's interest becomes clear as students see which of their articles are published in distant locations.

These changes in test scores validate the learning that is evident when students are engaged in cooperative work with their peers. Computers extend rather than replace teachers. By encouraging students to work on real problems with peers in different locations, the computer networks help extend systematic inquiry, promote creative problem-solving, and establish important cooperative learning skills. The development of these skills are critical for participation in our present and future society.

The InterCultural Learning Network and 7th Grade Students in Israel

Another research project designed to explore the effect of audience and purpose on the quality of students writing was carried out cooperatively by Cohen and Riel (in press). They compared the quality of students' writing in two conditions: (1) writing to a distance audience of peers over the InterCultural Learning Network and (2) writing for their teachers for their semester grade.

The subjects were 7th grade students from two classrooms taught by different teachers in a school in Jerusalem. The 22 students in each class wrote two compositions. One was a final requirement for the assessment of students' writing ability as a regular midterm examination; the other was to share some information about their culture with their peers in other countries over the InterCultural Learning Network. The two compositions were written a week apart from each other counterbalanced for order effects.

Student papers from each classroom were collected. Teachers were given all of the papers from both conditions together and asked to evaluate the papers without knowing under which condition a paper was written. The papers were also assessed by two independent judges using a standard analytic evaluation profile.

Prior to the study, the teachers assumed that the essays written for semester grade would be better than those written to peers because they believed that they would take more care in both the content and form of their writing when grading was involved. The results, in table 2, show that this in not the case. The compositions written to peers on the computer network were assessed as significantly better than those written for a midterm exam regardless of the order of the assignments.

Students' writing for teachers was more abbreviated since they shared a common background and set of experiences. With their distant audiences, they were more explicit and provided many more details in describing their experiences. They also used less slang and fewer colloquial and personal expressions when writing for their international peers.

The independent judges also gave higher scores to the papers written for the network. regardless of order. They found that the content was more substantive and the thesis was better supported. The use of language was more effective, incorporating more complex constructions and having less errors of agreement (see Table 3).

These results show a clear improvement in writing when students wrote to communicate their ideas with distant peers. The task of writing in schools is artificial when students are required to "write as if" they have information to convey on topics they did not select, and to "write as if" they are addressing a general audience that is never specified. Students demonstrated that they could write better when they were asked to write rather than when they were asked to demonstrate their writing skill in an artificial situation.

Reintegration of Students with Society

Implicit or unspecified audience conditions are the norm for classrooms from first grade to college. They are the outcome of an unfortunate separation of school from society. The efforts to create meaningful learning environments for writing are a way to counter this trend of decontextualized learning. Some teachers of writing try to attenuate this situation by making the audience and the goal explicit for the student in a role playing exercise (Ede, 1979). The assignment becomes "Pretend you are X writing to Y for Z purpose." The exercise remains hypothetical, however, because the text is never read by anyone except the teacher and the students know it. While this is likely to help students experiment with audience and writing purposes, new technologies make it possible to go much further. Students *can* write to their peers in other countries sharing their cultural and geographic perspectives on worldwide issues. They *can* also write to adults to share their views and opinions regarding social programs that impact youth. Companies that manufacture products for children would have a better sense of their market if students wrote to them. Scientists can organize students to help collect data on real problems that face our society.

Learning does not have to be totally separated from the contexts in which it is applied. Writing is much more effectively learned when students direct their writing to specified audiences to accomplish goals rather than spending years "practicing" writing in school. By contextualizing the skill in communicative settings, students are more likely to utilize skills learned in classrooms outside of school. Studies on the transfer of a skill learned in one setting to another indicate that the best way to increase transfer is to make the contexts as similar as possible, thereby eliminating the problem of transfer (LCHC 1982). Thus, if we design school activities to more closely model those in the society at large, the problem of transfer is reduced.

Educational technology may provide the key to a radical recontextualization of learning. Computers and networks enable students to participate more fully in meaningful activities. Drill and practice is placed in a more direct and meaningful relationship with performance. The recognition that accompanies skillful performances may be just what kids are missing when they dismiss school as boring.

The dangerous split between what is learned in school and the skills needed in the society that Dewey recognized at the turn of the last century can finally be eliminated as we move into the next century. Computer networks make it possible to increase the range of goals and audiences for students' writing, and in doing so may provide the first step in the process of reintegrating students into the larger society.

References

Cohen, M. S., & Miyake, N. (1986). An intercultural learning network: coming of age in electronic messaging. *Instructional Science* **15** 257-263.

Cohen, M. & Riel, M. (1988) The effect of distant audiences on students' writing. *American Educational Research Journal* (in press).

Dewey, J. (1916). *Democracy and Education.* New York: The Free Press.

Ede, L. (1979). On audience and composition, *College Composition and Communication*, 30, 291-297.

LCHC (1982). Culture and cognitive development. In: Paul Mussen (Ed.) *Carmichaels' Manual of Child Psychology*

Levin, J. A., & Cohen, M. (1985). The world as an international science laboratory: Electronic networks for science instruction and problem solving. *Journal of Computers in Mathematics and Science Teaching,* **4**, 33-35.

Levin, J. A., Riel, M., Boruta, M., & Rowe, R. (1984). Muktuk meets jacuzzi: Computer networks and elementary schools. In Sarah Freedman (Ed.), *The acquisition of written language,* New York: Ablex Publishing Company.

Levin, J. A., Riel, M. M., Miyake, N., & Cohen, M. (1987). Education on the electronic frontier: Teleapprentices in globally distributed educational contexts. *Contemporary Educational Psychology* **12**, 254-260..

Mehan, H. (1989) Microcomputers in classrooms: Educational technology or social practice? *Anthropology and Education Quarterly* (in press).

Mehan, H., Moll, L. & Riel, M. M. (1985). *Computers in classrooms: A quasi-experiment in guided change.* (Contract No. NIE 6-83-0027). La Jolla, CA: Teacher Education Program.

Mehan, H., Riel, M. M., & Miller-Souviney, B. (1984). Knowledge of text editing and control of literacy skills. *Language Arts,* **5 (5)**, 510-515.

Newman, D. (1984). *Functional learning environments* (Tech. Rep. No. 25). New York: Bank Street College of Education, Center for Children and Technology.

Riel, M. M. (1985). The computer chronicles newswire: A functional learning environment for acquiring literacy skills. *Journal of Educational Computing Research,* **1**, 317-337.

Riel, M. M. (1987). The InterCultural Learning Network. *The Computing Teacher Journal,* **14(7)**, 27-30.

Riel, M. M. (1988), Technology: The link to the future of education, *Educational Technologies*, (in Japanese) 42:108-113.

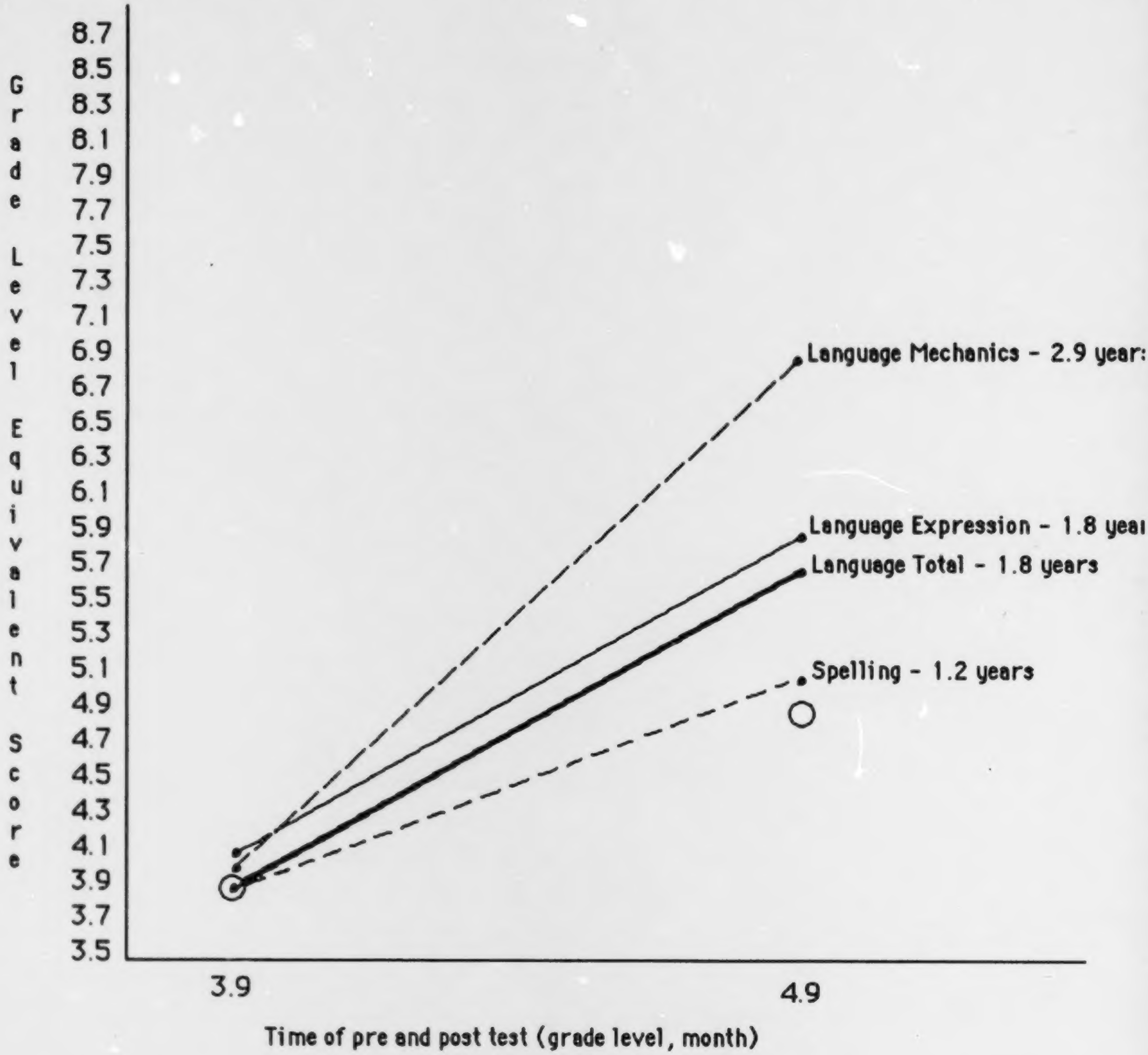


Figure 1: The comparison of scores on the Comprehensive Test of Basic Skills (CTBS) for fourth grade students involved in the Computer Chronicles Newspaper Task.

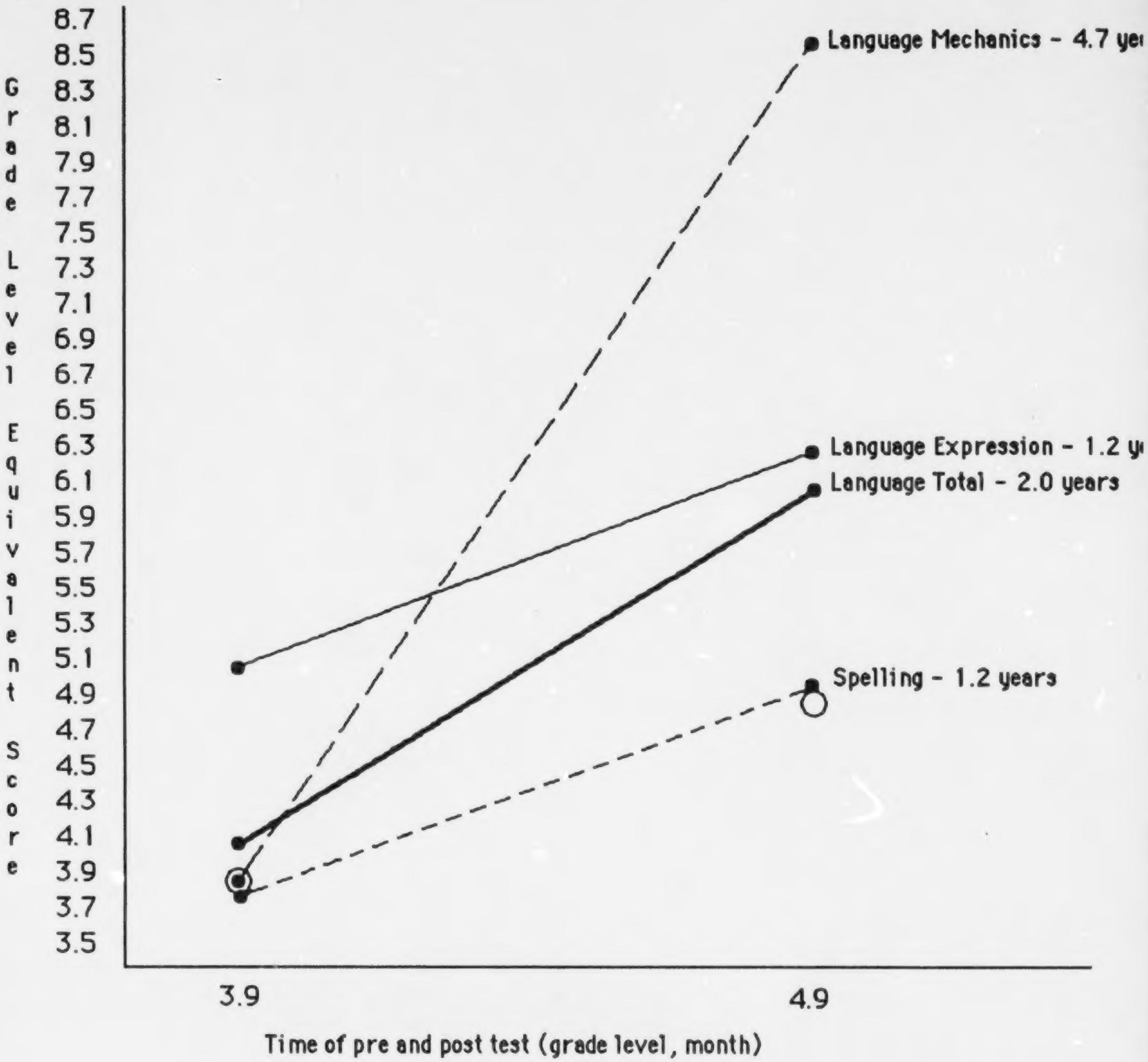


Figure 2: The comparison of scores on the Comprehensive Test of Basic Skills (CTBS) for the first editorial board for the Computer Chronicles Newspaper Task (n=4).

diff. Teacher	Networking Experience 6th grade Class	No Networking; Same Year, different Teacher 6th grade Class	No Networking; Year, Same 6th grade Class
Grade Level at Time of Test	(6.8)	(6.8)	(6.8)
Language Total	7.9	6.3	6.8
Spelling	7.7	7.0	7.3
Mechanics	7.4	6.0	6.8
Expression	8.6	6.9	7.5
Reading Total	8.8	7.2	7.2
Vocabulary	8.4	7.3	7.2
Comprehension	9.0	7.1	7.2

Table 1: A comparison of SRA Grade Level Equivalents Scores for 6th grade Students in Alaska who participated in the InterCultural Learning Network with two other classrooms who did not have any networking experience.

Mean Scores of Students' Compositions.

		CONDITION 1 TEACHER EVALUATION n = 44	CONDITION 2 PEER COMMUNICATION n = 44	T-TEST
Content	M	2.14	2.65	4.37 **
	SD	.64	.92	
Organization	M	2.09	2.74	4.91 **
	SD	.75	.93	
Vocabulary	M	2.14	2.26	2.35 *
	SD	.77	.82	
Language use	M	1.93	2.35	4.14 **
	SD	.70	.90	
Mechanics	M	2.30	2.44	2.22 *
	SD	.74	.77	
Total score	M	10.60	12.44	5.04 **
	SD	3.09	3.89	

* p<.05

* * p<.001

Table 2. Comparison of Analytic scores for the sets of papers. Mean scores are based on a 1-4 point scale with 4 as the highest.

Teacher Evaluation of the Student's Writing

7TH GRADE	CLASSROOM 1 (N= 22)		CLASSROOM 2 (N=22)	
ORDER	To Peers	For Exam	For Exam	To Peers
MEAN	72.86	66.90	72.50	77.50
SD	(8.0)	(7.3)	(6.1)	(7.2)
T-TEST	t= 5.56 p < .001		t=6.80 p < .001	

Table 3. Comparison of teacher evaluation of 7th grade compositions written under two conditions: (1) To send to distant peers on a network and (2) To be scored for semester grade. Scale used is 0-100, with 100 representing a perfect paper.

Paper presented at the International Symposium on Telecommunication in Education, Jerusalem, Israel, August 21-24, 1989. The research reported in this paper was the collective work of a number of researchers and teachers. I would especially like to acknowledge the contributions of Moshe Cohen, Caroline Garland, James Levin, Hugh Mehan Barbara Miller-Souviney, Naomi Miyake and Randall Souviney. Requests for copies should be sent to Margaret Riel, 943 San Dieguito Dr., Encinitas, CA.

SPACETIME PHYSICS: A COLLEGE COURSE TEAM-TAUGHT ON BITNET FOR ACADEMIC CREDIT

Richard C. Smith, The University of West Florida, U.S.A.

I. INTRODUCTION

Spacetime Physics was a 13-week electronic-mail college course offered in early 1989 to physics students at eight institutions in the United States and Europe. It was taught cooperatively by regular physics faculty at the participating schools, and registered students received academic credit at their own institution. The course was undertaken for three primary reasons:

1. To provide an opportunity for undergraduate physics students to discuss physics concepts in words, instead of equations;

2. To give students more responsibility for their own learning than usually exists in a conventional course;

3. To offer to the students a learning experience which extended beyond the boundaries of their own campuses, and to give them exposure to other students in national and international settings;

4. To give the students personal and continuing access to the textbook author.

The telecommunication links were established among the central computers of the participating institutions, which means that the course was aimed at conventional on-campus students already registered at an academic institution. This experience is thus in contrast to those telecommunications efforts which are aimed at remote and nontraditional learners.

II. COURSE DESCRIPTION

The course was organized by volunteering physics faculty members at the following eight institutions:

Boise State University (Boise, Idaho)
Dickinson College (Carlisle, Pennsylvania)
Massachusetts Institute of Technology (Cambridge, Massachusetts)
New Mexico State University (Las Cruces, New Mexico)
Oberlin College (Oberlin, Ohio)
Towson State University (Baltimore, Maryland)
University of Vienna (Vienna, Austria)
University of West Florida (Pensacola, Florida)

Each faculty member arranged for local registration of their students and decided on appropriate academic credit for the experience. Students therefore were registered for a physics course at their own school, for which they paid registration fees locally. Academic credit depended on each school's credit system, but typically students earned two semester hours or the equivalent for the course, though subsequent offerings of the course will offer 3 semester hours credit. Course planning was accomplished by the faculty team using electronic mail discussions beginning several months before the course started and continuing for the duration of the course.

BITNET

The BITNET mainframe network connects over 2,500 computers at several hundred colleges and universities in North America, Europe, and the Far East. The net was designed primarily for text exchange, so that there is no provision for graphics information in the messages themselves, except for those laboriously constructed with text characters. This seeming disadvantage was turned into an advantage in the Spacetime Physics course, because it challenged students to express their ideas in word-based discussion, rather than allowing them merely to swap equations back and forth, a customary mode of communication among physicists.

The effects of a computer conference were obtained by distributing all mail messages with the Listserv mailing list software package, in wide use at many institutions on BITNET. The University of West Florida served as central host for the course, and all messages were routed through the Listserv running on the UWF IBM 4381 mainframe computer. All students and faculty in the course were listed as subscribers to several mailing lists, so that when a student sent a mail item to LISTSERV@UWF, that piece of mail was redistributed to everyone in the course for reading, review, and response, also via Listserv.

Among the attractive features of Listserv are its automatic maintenance of all messages in archive files, which can be obtained by any course participant at any time. In addition, Listserv provide automatic statistics of participant use, so it was easy to see which students were participating and which ones were not.

Conduct of the Course

The subject of the course was Einstein's Theory of Relativity, chosen because it could reasonably be discussed in non-mathematical terms, a strong requirement for courses discussed in a text-based medium. The text was Spacetime Physics,[1] a book which approached the topic in conceptual form and therefore proved an excellent resource for this course.

The text was in mid-revision to its second edition, and co-author Edwin Taylor agreed to participate in the course not only to examine the pedagogical issues of the e-mail format, but also to obtain student feedback and suggestions to assist in the revision process. Taylor also provided exercises to be assigned to the students and several versions of the unit tests, which were to be passed at 85% mastery level.

The subject matter was divided into three identifiable sub-groups, and separate Listserv mailing lists were defined for each of the sub-groups in an attempt to keep discussion focused. This division was based on a powerful feature of the PARTICIPATE software used in a previous, non-BITNET, version of this course.[2] The attempt to maintain separate discussions failed, however, since the various mail handling facilities at each institution usually presented mail to be read in chronological order, not grouped according to mailing list, so that the desired separation simply was not achieved at the reader level.

There was considerable interest in the course from a variety of BITNET patrons, among them: (1) students who wished to listen in on the discussion without the benefit of an organized group at his or her institution; (2) physics faculty members at institutions who wish to follow the progress of this experiment; and (3) non-physics faculty members who were interested not in course content but rather in the unusual course format. These persons were classified as "auditors", who received copies of all the mail exchanges as they occurred, though they were not permitted to add their own comments.

Schedule of Topics

The comparatively slow pace of an electronic mail discussion means that the time required for the conventional sequential scheduling of chapter topics is much longer than can be obtained in a conventional course. On the other hand, the leisurely pace of topics admits parallel scheduling of several topics simultaneously, so that students are discouraged from the myopic view of one chapter having little relation to any others. Accordingly, the course was scheduled according to the time line illustrated in Table 1, in which a given unit of one or more chapters would span several weeks, including topic discussion, exercise discussion, and a Unit Mastery Quiz. A new unit was introduced every week, so that several activities were scheduled at the same time. For example, consider the week of February 6 as shown in Table 1. During this week, the class was scheduled to take the Unit 2 (Chapters 4 and 5) Quiz, material for which he/she began discussing on January 23. The class was also working the Unit 3 (Chapter 6) Exercises, and just beginning the Unit 4 (Chapters 7 and 8) discussion.

Key Personnel

Five distinct roles were defined for the course, and each participant filled at least one, perhaps more, of these roles. The Course Coordinator (CC) had the responsibility of managing the overhead associated with BITNET and Listserv operation, and to deal with requests for information from non-course participants. It was the CC's responsibility to moderate all the planning discussions that took place with the faculty team, and to distribute to the local Liaison Professors

Table 1: Schedule of Topics for first half of course. Numbers 1, 2, 3, etc. in the Table refer to Chapters in the textbook. See text for further discussion.

```
                         Jan           Feb             Mar          Apr
                    16  23  30  6   13  20  27  6   13  20  27  3   10  17
------------------  |---|---|---|---|---|---|---|---|---|---|---|---|---|---|
Unit 1:           +  111 111    |               |               |
Events & Measure  |  222 222    |               |               |
                  |  333 333    |               |               |
                  |      Ex1    |               |               |
                  +          Qz1|               |               |
                                |               |               |
Unit 2:           +      444 444|               |               |
Intervals         |      555 555|               |               |
                  |          Ex2|               |               |
                  +             |Qz2            |               |
                                |               |               |
Unit 3:           +          666|666            |               |
Proper Time       |             |Ex3            |               |
                  +             |    Qz3        |               |
                                |               |               |
Unit 4:           +             |777 777        |               |
Lorentz Transf    |             |888 888        |               |
                  |             |    Ex4        |               |
                  +             |        Qz4    |               |
```

weekly records of participation for the students at their school. It was also the CC's responsibility to monitor student participation in the course, and to provide private e-mail encouragement to those students who were falling behind the expected level of participation.

The Resource Professors (RP) were the members of the faculty who actually provided the weekly assignments and posed the particular topics for discussion. It was the RP's responsibility to monitor and guide the discussion and to encourage students to help with the answers to questions from other students. A major challenge to the RP's was to deflect personal requests for assistance back to the group at large, thus avoiding the time-prohibitive problem of forming one-to-one tutoring relationships with each of the students. Students soon learned to tap the (considerable) understanding of their classmates.

The Liaison Professors (LP) at each participating institution arranged the local registration and credit for the course. Most of the LP's regularly with their students in on-campus discussions, and also provided BITNET and Listserv instruction to the students at their school. They administered and graded the quizzes and turned in a final grade at their own institution.

The Guest Author (GA) had the responsibility of reading and responding to all the reading memos sent to him by the students, and to join in the e-mail discussion at large as appropriate.

Finally, the Student's responsibility was to read the material as assigned, to take turns as designated primary responders to discussion questions at the beginning of a discussion cycle, and to assist other students.

Reading Memos

One requirement for satisfactory completion of the course was that each student provide to the textbook author at least one comment, called a Reading Memo, for each chapter in the text. All such memos were by private e-mail outside of the general mailing list and were confidential between the student and the text author. The author answered each Reading Memo. It was in fulfilling this requirement that the students were able to establish a personal relationship with the author, and participated in what was perhaps the strongest part of the course. The memos typically fell into one of several categories:

1. *Endorsement of the text*: "WOW!" What a tremendous textbook! This is likely the clearest, most engaging text I've ever seen on any subject."

2. *Identification of text errors*: "I think I just found REALLY BAD typo in Chapter 17. The stuff you have is wrong (you're stuff is mostly right but half upsidedown . . . If I'm right, please have mercy on the other folks in the class and TELL THEM TOO! :-)" We note in passing that the author of this memo has discovered the value of adding a human touch (the smile face at the end of the quote) to electronic text.

3. *Suggestions for text changes*: "Can't you dig up some better picture of Einstein than that? It looks like a tacky postcard bought at a turnpike rest stop." Or consider this one: "I'm glad for the historical quotes, but I could I also have some historical perspective. What was Galileo talking about when he said that line to Kepler? I feel as if you just yelled 'I know a secret I won't tell' and then ran away."

4. Personal exchanges: "I was also surprised . . . that one of the authors had actually talked to Einstein (was that you?). Somehow it seems a revelation to me that this exchange could have occurred."

5. Request for suggestions from the author: At several points, the author posed a suggested treatment for a particular topic and asked (and received!) the class's reaction to it.

Extra Credit Projects

Students desiring an A or B in the course were required to submit optional projects. The projects themselves were guided investigations into particular applications of the subject matter, and were outlined in detail in the materials provided by the textbook author. Students completed each project independently, but they were encouraged to discuss the project via electronic mail, for which purpose a separate list was opened on Listserv. About half of the class elected to accept this challenge.

III. DISCUSSION

The participation level among students varied widely, a few not participating in the e-mail discussion at all. These were students who had been "volunteered" for the course in addition to their already scheduled classes, and simply lacked the time to work on this course as well. Only 20 of the 27 enrolled students were regular participants in the discussions, averaging 22 messages each, approximately two per week. There was considerable variation in the message volume week to week, as shown in Figure 1. The low volume in Week 10 clearly shows the effect of three schools simultaneously on Spring Holiday. The record of Reading Memos is shown in Figure 2, with a total of 185 memos for the 17 chapters, an average of eleven per chapter. The drop-off at the end occurred at a time when demands of other courses were being placed on the students, and also reflects a general feeling that the students were less comfortable with the later chapters than they were with the early ones.

IV. CONCLUSIONS

The first set of lessons learned from this experience relates to the technical problem of conducting a course over a rapidly growing computer network, many of whose member institutions were just getting their first experiences with extensive electronic mail. Among the problems faced were: (1) Students were allocated inadequate computer storage space for large volumes of in-coming and out-going mail; (2) Institutions used mail handling software with which they were only marginally familiar; and (3) a lack of e-mail experience at some of the schools. There is a clearly indicated need for extensive training in electronic mail procedures, a task made more difficult by the wide variance of mail handling software and mainframe hardware throughout BITNET. A second realization was that the time required to sift through 8 to 10 new messages every day of the week and make appropriate comments was extremely time consuming, and that there is need to develop strategies for dealing with this volume load.

A second set of learnings relates to organizational and pedagogical issues. We had not fully anticipated the effects of widely varied academic calendars, so that we were deprived of the participation of our Viennese colleagues for a full month in February while they were on vacation, while all the North American students were hard at work. Spring holidays occurred at different times as well. Another major challenge was to discover and maintain the appropriate pace of progress in the course, neither too slow so as to lose focus nor so fast as to

Fig. 1. Weekly mail volume

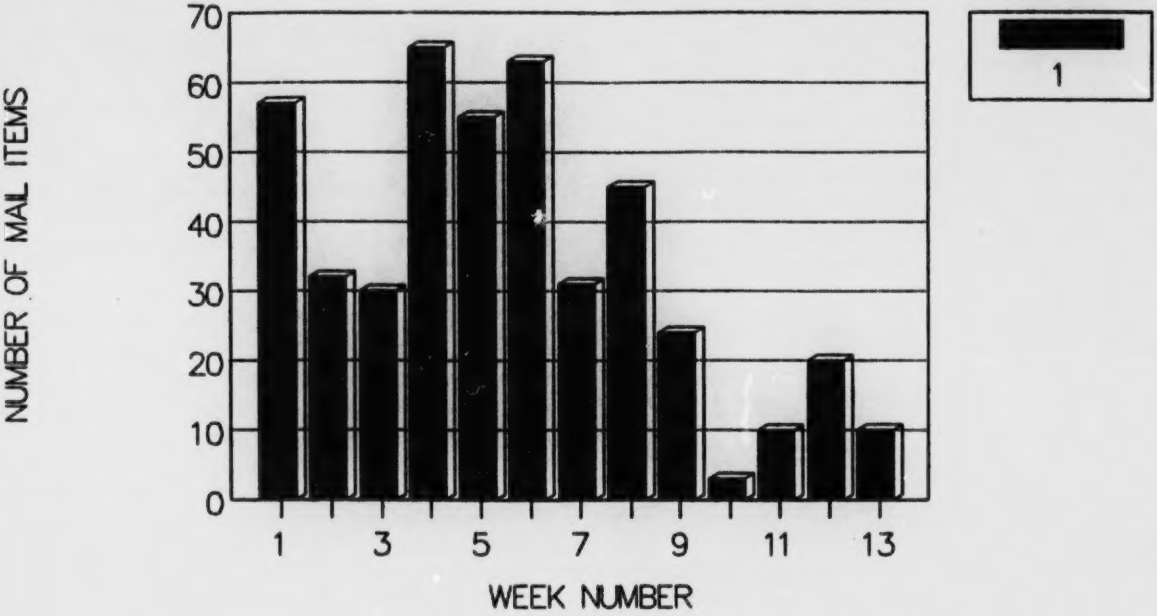
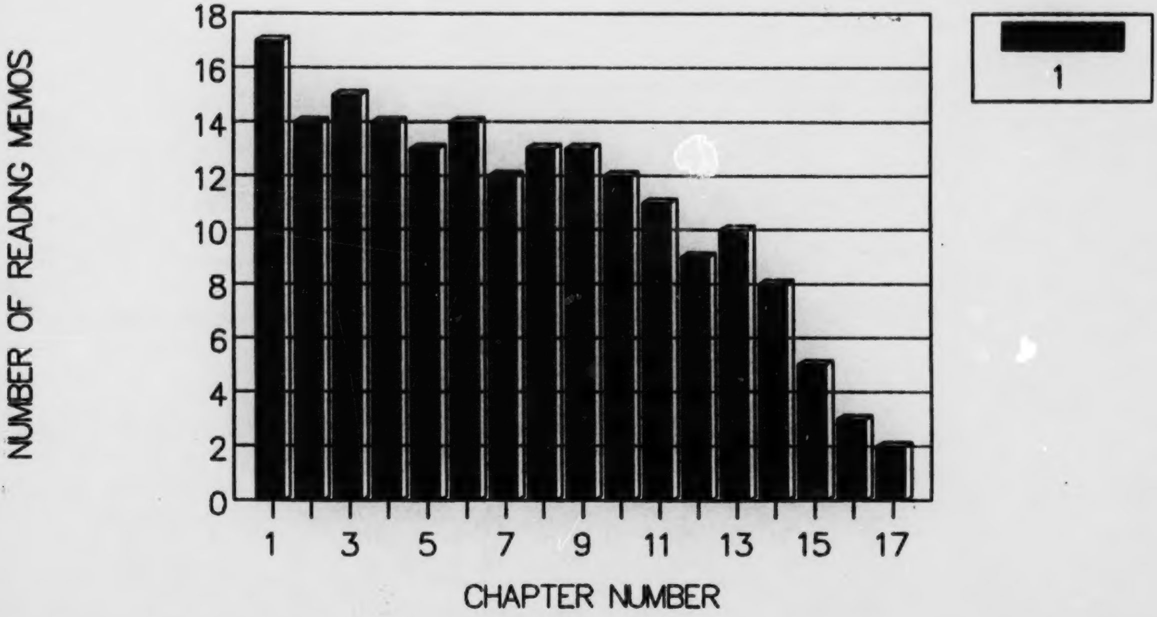


Fig. 2. Reading Memos Received



discourage participation. Revisions in the course pacing strategy are already underway for use in a possible subsequent course.

We were not surprised to learn that students showing the greatest success were located at institutions where the involvement of Liaison Professors was high. It is also not surprising to learn that students volunteering to take the course for no academic credit quickly lost interest and dropped out of participation.

IV. ACKNOWLEDGMENTS

The planning and execution of this course was the sum of efforts of the faculty team, composed of Dewey Dystra, Bruce Richards, Pricilla Laws, Helmet Kuehnelt, Harry Bates, and especially Alex Burr, who also served as Resource Professor and Discussion Leader for the middle third of the course. All of us are greatly in the debt of Edwin Taylor, who not only provided the textbook and all materials, but forged individual relationships with participating students through his faithful attention to the Reading Memo concept, which was his own.

Endnotes

[1] John Archibald Wheeler and Edwin F. Taylor, Spacetime Physics, 2nd Edition, W. H. Freeman, San Francisco (to be published).

[2] Richard C. Smith, "Teaching Special Relativity Through a Computer Conference," Am. J. Phys., 56, 2 (January, 1988).

LEARNING LINK - A PUBLIC TELECOMMUNICATIONS SYSTEM OF REGIONALLY-BASED INFORMATION SERVICES FOR EDUCATORS.

Robert Spielvogel, Erica Marks, Learning Link National Consortium, U.S.A.

LEARNING LINK is an alternate model for providing educators and students with both the means for economical access to telecommunications and the reasons for using such access on a regular basis. While national and international networks on large, central hosts provide educators with a growing body of services, regular access to such systems can be costly. Regionally-based communications centers can provide a wide range of information services of more immediate interest to these groups while facilitating access to the national and international networks.

LEARNING LINK is a system run by a non-profit consortium of state or local public broadcasting agencies. Some of these agencies are community-based while others are housed in state education departments or universities. All operate independent UNIX-based online systems for K-12 educational support. Each system can be adapted to local needs in terms of size and services offered. It can start as small as three or four phone lines coming into a specially configured personal computer and can grow into a much larger configuration serving dozens of simultaneous users. This flexibility keeps initial capital investment small but allows for growth as usage increases. While each system is a separate entity, the sites are linked together to exchange mail, discussion, content and technical support. A core national staff provides ongoing development and support for both content and the actual host systems used by each site.

This structure has several advantages:

1. Each system has a large, rich set of information designed to meet teachers' needs. The communications facilities are embedded in an environment that provides lesson-planning services, professional in-service training, and resource location/acquisition utilities. Each site receives information and updates prepared centrally by the national staff but each site is responsible for adding local information and services. The databases, resource lists, reviews, bibliographies and lesson plans provide a context for the use of the system's interactive communication tools such as E-Mail, threaded discussions, bulletin boards, real-time conferencing and surveys.

2. Since the sites are based at public broadcasting stations, the services build upon and compliment the use of educational television and video. Computer-based telecommunications doesn't stand alone as an isolated resource; it is intertwined with other educational telecommunication technologies. Public television programming benefits because the online system helps teachers connect these broadcasts and videotape collections to specific curriculum objectives. The online service is aided by addressing a real educational need and by having access to existing field staff that public televisions stations that are already providing workshops, training and support to teachers in their service area.

3. Local resources such as cultural agencies, performing arts, teacher professional groups, teacher-training institutions and teachers with particular expertise have access to tools that enable them to use the local system to mount information and to communicate with schools. It doesn't make sense to connect to a national system to locate resources in the adjacent district or at a nearby university.

4. The systems can forward mail and messages in batches late at night thus providing national and potentially international exchanges at reduced rates. Users can gain access to and feedback from national experts and educators in other regions. Each site can also serve as a channel to national online utilities providing background information, pre-connection preparation, and post-connection support and discussion. This makes national and international communications a more relevant and justifiable educational endeavor.

As we develop the capabilities for global educational telecommunications, a hierarchy of systems will emerge. Large national and international systems will link regional systems such as the LEARNING LINK sites which, in turn, connect districts and schools. In this sense, the "global village" is not one village but rather many linked "villages" with each capable of communicating with the others while retaining the regional distinctiveness necessary to reflect the diversity of human communities.

TEA-NET TEXAS EDUCATION AGENCY ELECTRONIC COMMUNICATION NETWORK MODEL DISTRICT PROJECT

Connie Stout, Texas Education Agency, U.S.A.

INTRODUCTION

The two school districts involved in the model district project were North East Independent School District and Judson Independent School District. Both districts are located in the San Antonio area. North East ISD has 41 campuses with an average daily attendance (ADA) of about 38,000 students. Judson ISD has 15 campuses and an ADA of about 12,000 students. In September, 1987, personnel from the Texas Education Agency and GTE Education Services THE ELECTRIC PAGES™ visited the model districts and interviewed superintendents, coordinators, and teachers to determine their experiences, attitudes, and recommendations about using the district electronic network to communicate within their districts and to communicate with other districts throughout the state. Based on their feedback, a model implementation plan has been designed to be used by other districts that are considering implementing such a district-wide network.

NETWORK DESIGN

Texas has nearly 1100 districts and over 6500 campuses. This number makes it technically very difficult for all campuses to access THE ELECTRIC PAGES™' host computer in Dallas. In addition, the connect charge would be cost-prohibitive when looked at from a state perspective. THE ELECTRIC PAGES™' electronic network is configured to handle the volume that would be demanded by the approximate 1100 districts in Texas by establishing a distributive host system. This network system has three major components: (1) a main frame host computer located in Austin; (2) a personal computer with the local network host software (InfoExchange) usually located in the central office; and (3) a personal computer operating the communication software (InfoAccess) located at each site. The model district's local host computer accesses THE ELECTRIC PAGES™ host computer in Dallas via 1-800 telephone lines. All of the communication sites located in a district access their local host via local telephone lines using InfoAccess.

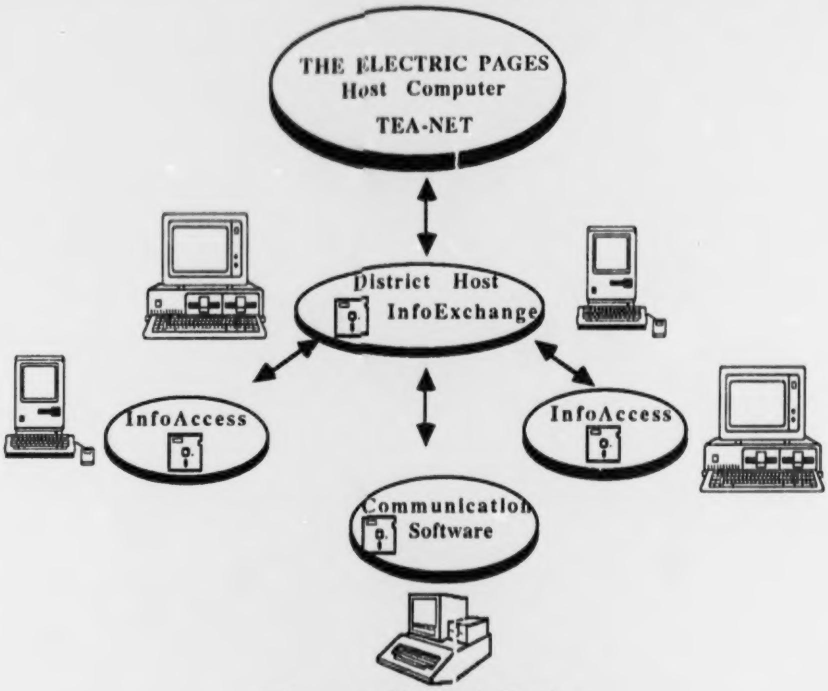


Figure 1. Network Design

During a typical operational cycle, the local network host operating InfoExchange automatically initiates a call to THE ELECTRIC PAGES™ host in Dallas. These connections usually occur at night when connect rates are reduced. The local network host computer receives updates from TEA, other professional organizations who stored information on THE ELECTRIC PAGES, as well as all mail for the users of the local network system. At a later time, local users run InfoAccess on their personal computers to log on to their local host computer. Although individual users can use any communication software to access the local host, many districts such as North East ISD have found that the automated features of InfoAccess speed up communication. InfoAccess is programmed to automatically call the user's local host where it retrieves mail and information that has been downloaded from THE ELECTRIC PAGES™ host computer. In addition, the program automatically sends all the user's mail that has been prepared off line.

Used in this manner, the local user does not incur a connect charge when accessing information from THE ELECTRIC PAGES™. The network design is one that gives administrators, teachers, and students access to information and mail from across the nation, state, and district without incurring the burden of a connect cost.

In addition to having access to information from a national bulletin board on their local host, InfoExchange enables the district to design its own individual bulletin boards. North East ISD designed a bulletin board area for the superintendent, special programs, instructional staff, and administrative services. Judson ISD created a bulletin board area for administrators, the public information department, and each school campus. The electronic communications system created provides much needed information to administrators and teachers. Through this system, principals could receive news and information from TEA overnight. They could also send information to other district schools, regional service centers, universities, and to schools in the nation that subscribe to the system.

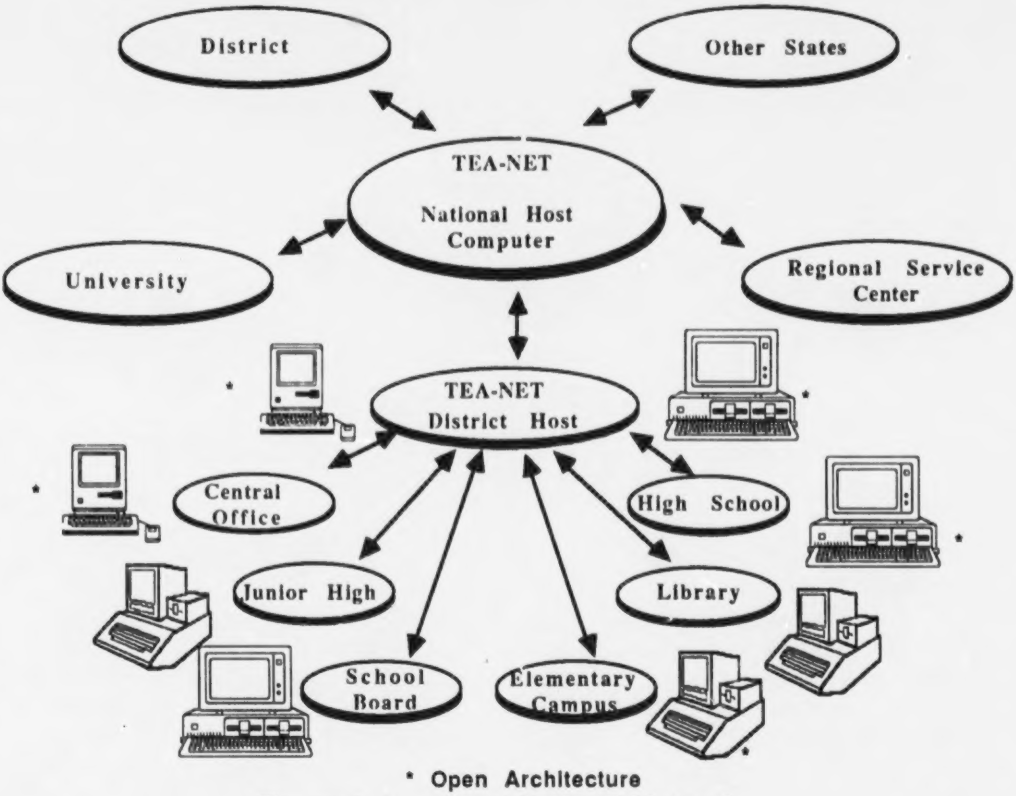

District
Other States
TEA-NET
National Host
Computer
University
Regional Service
Center
TEA-NET
District Host
Central
Office
High School
Junior High
Library
School
Board
Elementary
Campus
* Open Architecture

Figure 2. Local and National Network

BENEFITS FOR ADMINISTRATORS

One of the major benefits of the use of the system was, for the first time, administrators wanted a computer on their desks, and they wanted to use it. Using a computer to communicate with their peers gave principals and central office administrators the incentive to begin learning to use the computer for word processing and spreadsheet applications as well. Another benefit noted by administrators was in the area of time savings. These savings occurred in memo transfer, elimination of telephone tag, tracking of maintenance records, processing work orders, and general personnel services.

Feedback from the two model districts suggested that the project put the administration on-line with technology. Before the model district project, both districts had difficulty getting administrators to use computers. Although some of the initial reaction was negative (eg. some administrators were hesitant about using a computer), the attitude toward the project was positive by the end of the year. The system at both districts was used extensively by elementary and secondary principals and the principals' secretaries. The experience demonstrated to the administrators that computers could be used for applications other than attendance. An additional positive benefit that the administrators reported was that district-wide communication was generally more effective.

INSTRUCTIONAL BENEFITS

An additional positive result was seen when telecommunications spilled over into the curriculum. Because a technical assistance person was needed on each campus, the computer literacy and computer science teachers in North East ISD were trained to use the technology. These teachers had an overwhelmingly positive response to the training. They felt the "local host" was imperative for the use of instructional telecommunications within a district. Students enrolled in the 7th grade computer literacy course used the technology by maintaining a bulletin board on the local host. The "sysop" or systems operator function was transferred from middle school to middle school on a monthly basis. Once a month, the teachers met to work on telecommunication projects. During the past summer, the teachers met to develop ways to integrate telecommunications into the computer literacy curriculum.

As a result of this positive reaction in North East ISD, instructional applications have grown to such an extent that the district chose to dedicate a computer to run InfoExchange solely for instructional applications, in addition to the computer that runs InfoExchange for administrative applications. The ten middle schools which offered computer literacy in the 7th grade acquired a phone line for each computer lab. The district revamped their computer literacy curriculum to include telecommunications. This approach proved positive as it allowed teachers to be involved in the development of the new curriculum. The model district project coordinators reported it created a positive need for teachers and students to become involved in telecommunications. Every 7th grade student at NEISD was able to participate in the project. The model district project coordinators felt that all students involved in the project were given opportunities to expand problem solving skills. Although the application was limited to the students enrolled in computer literacy, the district is looking at ways to expand into other academic subject areas.

TRAINING

A primary reason for the positive reactions to the system in both districts was the training and support provided by the district coordinators. Although training was managed differently in each district, both coordinators admitted it was a critical component to the successful implementation of the network system. Both districts offered a nine hour "hands on" training session for administrators and the building secretaries. North East ISD also included teachers in the training. An additional nine hours of training was offered by North East ISD during the summer for those who wanted to learn to integrate word processing into telecommunications and on-line skills.

Both North East ISD and Judson ISD took the approach of training the building administrators first and then training the teachers. Their reasoning was that it was critical to get administrators involved with the new technology and show them how it could make them more effective. The coordinators thought that the administrators would be more receptive to curriculum and instructional applications in a system they used themselves. As a result, they would be more likely to help procure the resources needed for instructional uses in the future. Too frequently, the coordinators reported, one could get support for administrative applications, but not instructional applications.

INNOVATIVE APPLICATIONS

Judson ISD initiated a very interesting project through their local network. They posted information on one of their bulletin boards and made it available to the parents in their community. They published an "open" ID and password enabling any parent, who had a computer, modem, and communication software, access to the information on the Judson Public Information Bulletin Board. The response was quite positive as it gave parents, and the community in general, immediate access to school information such as calendars of meetings and results of various competitions.

North East ISD found the use of the system for children in their homebound program to be extremely beneficial. When one of their students was injured in an accident and was placed in homebound services, North East ISD placed a computer at his home to keep in touch with his classmates. He received direct instruction from his homebound teacher, but used the computer communication network to access peers at school.

PROBLEMS

There were three major problems noted:

- Insufficient equipment was viewed as a problem. Although existing equipment was used in both districts, additional funds were needed to update some computers. At North East ISD, the elementary schools ran the system on two disk drive systems. Although the equipment was sufficient to run the software, it was not the preferred configuration.

- Turnover of personnel also was a problem. This emphasized the need for continual training programs.

- Both model district project coordinators noted that the length of time it took to start the project was significant. While this was not unexpected, it still caused some difficulties.

RECOMMENDATIONS

After a number of months with the project, both districts had quite a few recommendations. The following were the major suggestions that were common to both North East ISD and Judson ISD.

- Provide sufficient funds. In order for this to work, the district must put money into it for hardware, software, connect time, staff time, etc. The district coordinators believe it will save time in the long term, but initially it takes time to get the system set up and running.

- Require initial training. In the case of North East ISD, the coordinators felt the two-day session provided by THE ELECTRIC PAGES™ gave a critical perspective on how to set up and run the electronic network. They believed this initial training was critical for the successful implementation.
- Make sure a thorough training program is planned and carried out by the district coordinators. Require a minimum of twelve hours of telecommunication awareness and hands-on training for administrators, secretaries, computer literacy and computer science teachers in the district. Training can be done in the summer as well as throughout the school year. Network training can be combined with word processing training.
- Require a contact person for each campus to serve in a support role. Have these people trained by the district coordinators who have been trained.
- Require a district-wide adoption of one word processor to ease the support of file transfer functions.
- Train central office personnel first, then campus personnel. North East ISD trained campus personnel first, but their recommendation is to train central office staff first so that they can begin to see first-hand the benefits of a state-wide electronic network.
- Make the use of electronic mail mandatory throughout the district.
- Develop a local area network (LAN) version of THE ELECTRIC PAGES™ software to eliminate the use of modems at each site.
- Dedicate one person to develop the applications to be used with the telecommunications system.
- Work more closely with people within TEA to get more and better information on the TEA Bulletin Board.

CONCLUSIONS

Both district coordinating staff who were in charge of the day-to-day operations believe telecommunications for administrators and students is something which cannot be ignored. One coordinator remarked that if we are going to prepare our children for the future, we as administrators must also get involved and learn, at a minimum, what we are requiring our children to learn. If knowing telecommunications, word processing, data bases and spreadsheets are a minimum concept for children in 7th and 8th grades, then we must see that administrators know those skills as well. It is essential, they believe, to prepare children for the technology which they will encounter in colleges and business after they exit from the public schools.

One elementary principal noted that he felt it was a way for teachers to feel as though they are a part of the mainstream of education in Texas and not totally isolated in their classrooms. The teachers had been particularly thrilled to read the full text of a speech Dr. W. N. Kirby, Commissioner of Education, had given the previous day. Normally, the teachers only saw excerpts of speeches in the news. This way they were able to get the full story on an issue of great importance to them.

Since the conclusion of the Model District Project in August, both districts are expanding their local network to make it available to more administrators, teachers and students.

CHIMO: A MULTI-FACETED COMMUNICATIONS ENVIRONMENT FOR EDUCATION

Jo Ann Wilton, Peel Board of Education, CANADA

Communications, facilitated by advances in telecommunications and computer mediation are destined to significantly change human interaction and commerce. Education will also feel the impact of the increased connectivity and the disappearance of distance as a factor in exchange of information. Activities and related research have focused primarily on links between tertiary institutions and on distance education from those centres. A smaller number of less well documented applications have established links between classrooms for casual interaction or more formal task-oriented programs.

Computer-mediated communications offers a very flexible tool which can be shaped to play a number of roles for learning and teacher support. CHIMO is being managed to offer a variety of activities for different client groups on a single system and is working toward a development model for an integrated computer Communications system for education in Canada.

The key to success for CHIMO lies in the involvement of primary and secondary educators in project planning and research management and in the expertise of the on-line management team. However, tertiary educators are involved in specific projects and outside groups are making contributions to particular sub-groups of users. Although the project is comparatively new, the early results indicate both an excitement and a commmitment from elementary and secondary school users which justify further development of the CHIMO strategy.

Origins of the Project

The Peel Board of Education, an educational jurisdiction with over 90,000 students in elementary and secondary grades, has been following a five-year planned process of increasing the range and intensity of computer-mediated communications for instructional uses among its 160 schools. The philosophy behind the computer communications initiatives in Peel envisages for students and teachers a learning environment without walls (i.e., a 'virtual' library in each classroom and global resources in each school). Part of that vision will be realized through access to remote data bases but perhaps a more significant part will come through interactive dialogue with sources of information, with other seekers of that information and with other learners using the information.

The fall of 1988 was the scheduled time for Peel to acquire its own internal conferencing system. It was intended that this local level board network be augmented by school access to a provincial network EDAN (Educational Data Access Network) being piloted by the Ministry of Education in Ontario. The pilot project came to an end in the summer of 1988 leaving a vacuum for those in education who had become accustomed to the availability of conferencing activities. To respond to the demand for continued access to cmc (computer-mediated communications) facilities from other parts of the province, Peel increased the scale of its own project, sought outside funding and emerged as a nation-wide communications environment called CHIMO.

Focus of the CHIMO Project

Computer-mediated communications is a medium not an activity. Using the capabilities of the medium, it is possible to create a wide range of group structures and to tailor on-line activities to address numerous specific objectives. Most current educational communications networks focus on a particular intepretation of the medium aimed at one or two specific client groups. A few others are largely unstructured and basically provide open forums whose structure and content ebb and flow with the needs of the users.

The major focus of CHIMO planning is on structured learning and problem solving activities with clearly defined objectives, anticipated products and set timelines. It is essential that each activity, as well as management aspects of the project, are evaluated initially in terms of a set of criteria based on educational objectives. To that end, users do not have the power to initiate conference topics without submitting a rationale and plan in advance. Nevertheless, it is intended that the nature of the CHIMO environment will be open enough to accommodate unstructured exchange of ideas among teachers (and to a lesser extent, students) within general conferences or through electronic mail.

The resulting user environment is a mixture of i) open discussions which users can join or leave as their interests dictate and ii) a set of structured activities with access limited to subsets of users. Some of the latter group, structured activities, are working environments with product-based agendas while others are directed discussion topics each with a specific role in the communications pattern of a defined group of people. The balance between the two types of activities in the initial stages was in favour of the unstructured and open discussions but increasingly observation shows that users begin to identify more specific professional objectives for their use of CHIMO and seek conferences whose agendas meet their needs.

Because of the apparent high interest in computer commnications and the increase in demand for greater access for more users and more conferences, it is a challenge to the management team to keep the focus of CHIMO on high quality structured and planned learning activities for teacher and student. The summer months of 1989 will be used to prepare for the move toward CHIMO's major focus of planned activities scheduled to begin in the fall of 1989.

The Structure of CHIMO

i) Technical Environment

CHIMO is hosted on a UNISYS PW800 386 microcomputer with an increased memory capacity which brings the total RAM to 350 megabytes. A tape backup system is used to secure files and login records. The CPU is devoted to CHIMO and related files. This hardware was originally loaned to the CHIMO project by UNISYS Canada and later donated to the Peel Board of Education for the continued project.

The telecommunications links are made through 8 local dial lines and 8 Datapac (Canadian telecommunications network) lines. Local lines are handled through standard Hayes modems at 300 or 1200 baud - the range of most CHIMO users. An increase to 2400 baud is in the immediate plans.

ii) A Distributed Network

At present, the CHIMO network is hosted from one location. All users outside the immediate dialing area of Peel must use the telecommunications carrier, Datapac, and pay for the iNET service to access Datapac. This causes some inefficient network usage. For example, another school board is using CHIMO to conduct in-board conference activities yet all schools in that board have to pay communication costs to reach CHIMO's host.

The Xenix version of CoSy software which is used for CHIMO, has the capabilty to interact with other Xenix CoSy hosts. The concept is that the host computers can be set up to "call" each other at regular intervals (perhaps every three hours) and to exchange files for those conferences which are available to users on both hosts. At the same time, mail will be transferred from the host of the sender of the message to the host computer where the intended message receiver is registered.

In the fall of 1989, the CHIMO network will begin a distributed program with a Xenix CoSy host at George Brown Community College in Toronto. CHIMO users will have the option of participating in a conference listed on CHIMO called Adult literacy which, in fact, will be set up and moderated on the George Brown host. From the CHIMO perspective, users will read the conference messages and add their own in the same way they work on any CHIMO conference. It will be transparent to them that the messages are being updated only every three hours and that their message is actually posted on some host other than CHIMO.

iii) Future Network Structure

A model is emerging which suggests a tiered structure. There will be many host computers for local conferences involving mainly local schools and electronic mail links to nearby sites. At a second level, a set of regional host computers will be the site of conferences of a broader appeal. Managers of these conferences will probably be focussed on resources or professional groups with a regional composition. The structure logically extends to a national/ international level with either a separate host computer or one of the regional computers equipped to handle conferences with a national user group.

CHIMO may not be the centre of the resulting network but it is attempting to demonstrate the value and possibility of such links. At the very least CHIMO will remain as an active local host in a national network managed co-operatively by interprovincial government agencies.

iv) Conferencing Software

The objectives of the CHIMO project prompted the planners to seek conferencing software which was flexible enough to accommodate a wide range of user activities, each making slightly different demands on the CHIMO environment. The widely used CoSy software from Guelph University in Canada has the additional advantages of a distributed version of the software which will allow the CHIMO team to peruse the vision of a multi-tiered national system with access to international users as well.

CoSy provides electronic mail, conversation and conferencing capabilities. A chat mode also permits synchronous communication links between two users. The CHIMO planners modified the general CoSy environment to suit the objectives of the project. Conversations and chat modes have been removed from user access and the ability to create and moderate conferences is restricted to users designated by the managers as project leaders.

Like most packages of conferencing software, CoSy was designed to be hosted in university or college settings where programmers and technical support staff are readily available. A host in a school board situation is more difficult to maintain. CHIMO managers are working with CoSy managers at George Brown College to share developments and modifications to the software as it is used on a microcomputer-based system.

Activities on CHIMO

CHIMO offers links to professional groups and teacher resources, opportunities for in-service (both formal and informal activities) and collegial links for teachers in small or isolated schools. For students, CHIMO can be a place to meet students from other parts of the country or world, to access human resources through links to 'experts', to share in parallel studies among several classrooms (arranged by the teachers of the classes involved) and to participate in structured simulations and study groups.

i) Activities for teachers and administrators

If the CHIMO network was never used by classes of students, the cost and effort would be justified by the services it offers to classroom teachers. In the first 8 months of operation, there has been a wide range of teacher activities and more are being requested for the start of term in September.

1. Professional groups - Several conferences have been set up for groups of teachers: e.g., i) Executive of the Educational Computing Organization of Ontario (ECOO), ii) members of SIGTEL of ECOO, iii) executive of the Canadian Science Writers' Association, iv) members of regional subject co-ordinators associations.

2. Teacher resources - CHIMO does not have any data bases of its own, but there are many available through the iNET service. CHIMO is gradually evaluating them and developing a list of those resources which will appear on the CHIMO menu as extra cost options - one-stop shopping for the teacher. Besides these major data bases, teachers use CHIMO for less formal resourcing needs. There are conferences which are used to exchange information about the different types of hardware available in Canadian schools. Several of these are monitored by representatives of the technical support groups for the vendors involved. Teachers in need of assistance can usually get their questions answered in this public forum. This type of service is not limited to computer education topics. Ministry of Education officers are becoming available on-line to teachers who have questions about the development of courses.

3. Committee projects - Distance is a major consideration in Canada as a whole but even within a school board area, travel times can exceed several hours. Getting teachers together for meetings and shared development of curricula is difficult and expensive. Several projects on CHIMO have shown the way for future cost savings: e.g., i) a school board writing team use CHIMO as a means of meeting between meetings,

ii) mathematics teachers and school librarians used CHIMO as a vehicle to acccumulate lists of in-school resources suitable for independent study for senior math students, iii) the Minister of Education's Council on Educational Technology is set up to use CHIMO to carry on discussions in the periods of time between their infrequent face-to-face meetings.

4. Inservice - In an educational environment which is experiencing significant and rapid change, teacher training and support is a major issue. CHIMO will have an increasing focus on various creative strategies to promote curriculum renewal and teacher upgrades. The most structured of conferences to date which involves participants in a university course for practicing school principals is discussed later in the paper. In addition, i) teachers in remote communities on the north shore of the province of Quebec in September will begin a course in instructioanl design totally on-line on CHIMO conducted from the Faculty of Education, University of McGill, Montreal; ii) groups of teachers in two locations in Ontario have used CHIMO to share ideas as they independently pilot components of a new science curriculum; iii) unstructured conferences provide a vehicle to share information and ideas on the implementation of new software products.

5. Links to colleagues - For many participants, CHIMO has become an important connection to professional colleagues. Canada's demographic pattern results in many teachers working in isolated schools where they might be the only teacher of a particular subject in the region. CHIMO offers opportunities for social interaction through open conferences and more specific coaching and mentoring through electronic mail.

ii) Activities for student groups

According to the planned initial phase for CHIMO, very few student activities were to be started before September 1989. However, teachers who were anxious to do the preparation and moderating of student projects were supported in their efforts. Current and upcoming activities can be classified by three sets of criteria.

1. Locus of management of the project - Projects can be managed by central planners, by a group of users or by one or two individuals for their own classes. Major activities are directed centrally with a project group preparing materials and coordinating the activities. Many of these activities involve a registration process and several will have corporate sponsorship to cover the planning and management costs. For some projects, a group sets up their own projects which, while managed by the group, still must meet the educational requirements of the overall CHIMO goals. At another level still, small groups of one or two teachers are designing and carrying through projects involving their own classes.

2. Role of computer-mediated communication in the learning experience - A classification which is helpful for project planners identifies student activities in terms of the learning strategy each invokes.

   - simulations
   - competitive activities
   - collaborative work
   - comparative studies
   - investigation or research

On-line simulations are very powerful, intensive and highly planned activities. While students are communicating with other classes or individuals, they are role-playing and the nature of the communications is framed in terms of that role.

Competitive situations are also usually centrally managed, in this case, not because of the scale and complexity but to ensure some balance to the competitive component. On CHIMO, a mathematics competition among a group of 6 secondary schools was managed by a teacher and students at a seventh school. In September, this activity will be expanded to accommodate several parallel groups of six competitors and a managing school.

In the case of both simulations and competitions, the students do most of their work among their colleagues in the home classroom and just upload the product of their work. In contrast, projects which involve collaborative work or comparative studies involve more sharing across the communications links. Data are shared and, in the case of collaborative studies, the product of the work has joint ownership. Comparative studies help students to learn about different perspectives from different locations and at the same time learn to see their own location or perspective more clearly. These types of activities are the ones teachers and students seem to want to become involved in when schools are at a considerable distance apart. On CHIMO, several models of successful activities of this type are available to teachers who want to set up small scale sharing activities for their students.

Senior division curricula in Ontario place a heavy emphasis on independent study and resource use. CHIMO offers an opportunity for students to interact with other students doing the same research or to use cmc as a research tool. In the latter case, students can use classes in remote locations to gather data for their work or, through CHIMO, they can access 'experts' at the university level. Some work has been done already on students working with pre-service teachers at the Facuty of Education, University of Toronto to get coaching on their writing skills.

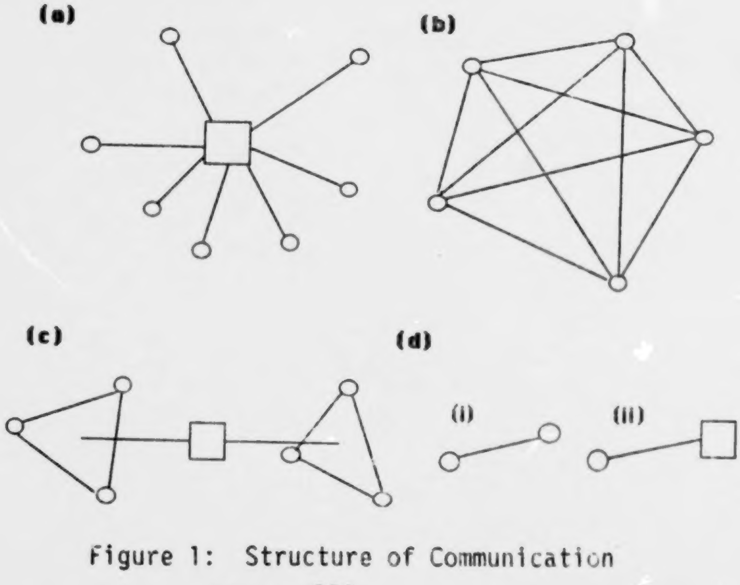


Figure 1: Structure of Communication

3. Structure of communication groups - Although CoSy like most electronic and conferencing software does not impose any internal structure on the group, the tasks which are set for any conference or group of users can imply or force structure and related group communication patterns. The most usual communication structure in CHIMO or any conferencing system is the full and open exchange of ideas, information research results. (Figure 1,b)

   CHIMO has some activities which are managed centrally with a centrally developed set of participant tasks or steps to follow. Student groups do not exchange messages directly and usually the pace and process of the activity is set by a central manager. (Figure 1,a) For some learning objectives, it is appropriate to have clusters of shared problem solving to prepare a joint submission to a centrally managed component of the project. (Figure 1,c) Where the learning experience involves investigating or information gathering, the communication pattern may be very simple. In most cases, examples would involve dialogue between individual classes of students or between a student and a centrally-provided expert or data base. (Figure 1,d)

It is going to be a challenge to the management team of CHIMO to meet the requests from the user group for student activities while maintaining the mandate of quality projects and related research. Where possible, activity guides will be prepared and distributed so that teachers can be in control of arranging their own communications activities without the need for central management.

Research

To the date of writing, there has been only one formal research paper completed related to CHIMO activities. Others are underway and several more researched activities are planned for the school year 1989-1990.

The Faculty of Education at the University of Ottawa runs, every other year, a course designed for experienced principals to renew their administration skills and up-date themselves on recent developments in education. During the winter of 1989, a portion of the work of this course was conducted on-line using CHIMO as a host location. In contrast to most previous research related to in-service and cmc where the subjects are enrolled in courses for which a mark and degree credit provides motivation, the principals were voluntary participants in the course. In addition, they were both researchers and subjects in the sense that their own use of the computer-mediated communications for the purpose of their course work was a personal evaluation of a new methodology for school administrators.

At the same time, the on-line activity and growth curve provide data for research by three faculty members.(2) Their observations relate to the learning curve of the principals, the pattern of use of open CHIMO activities as well as their private conference workspace and the contextual factors which affected opportunities to use cmc. Since the support of administration is important to the implementation of any innovation in education, the experiences and reactions of the principals may predict characteristics of the acceptance of cmc as an innovation within a school.

The Next Phase

CHIMO is still in its first year of operation and it has yet to address its full mandate. The first 8 month registration of approximately 450 schools in 9 of Canada's 10 provinces is certain to increase signficantly in the next school year. CHIMO managers currently are involved in planning groups with at least three major projects which will incorporate computer-mediated communications through CHIMO as in central part of the activity. Components of two of those projects will involve using CHIMO to link Canadian students with classrooms Europe.

It appears that the first stages of the CHIMO project indicate that the network is meeting a need among educators in the short term and is contributing to the research and wider scale system building that will be important for the future.

References

(1) Wilton, J. (1988). "CHIMO: The new kid on the block." ECOO Output, 9(4), 23-25.

(2) Ahola-Sidaway, J., MacLean, M. and Treuhaft, J. (1989) "The impact of telecommunications as a professional tool for inservice education of school administrators". Faculty of Education, University of Ottawa. (Awaiting publication).

MAKASH: A COMPUTER COMMUNICATIONS PROJECT FOR THE ADVANCEMENT OF EDUCATION & COMMUNITY
-A PROGRESS REPORT -

Dov Winer, Rimon Levy, Hermon Graif,P. Sapir College of the Negev, ISRAEL

Background

The Negev College serves a region that comprises 14 Regional Councils and Development Towns; students arrive also from the cities Ashkelon and Beer Sheba. In this area we have about 80 moshavim and 50 kibbutzim and one Beddouin village - Rahat. Excluding Beer Sheba, the population served is about 163 thousand. Academic courses in Social Sciences and Humanities are offered, there is a School of Practical Engineering and many other courses and programs aimed at upgrading human resources of the area for its economic and social development. Our programs for furthering educational uses of micro computers are an important part of these efforts.

The wide dispersion of the population served and its heterogeneous background rised very early our interest in new alternatives in distance education. The College was a pioneer through its Community Communications Center in training local communities personnel for the emerging community cable television projects, starting six years ago. It still maintains a leadership role in this domain.

A Videotex project for the area was outlined in 1983 when we established our Campus Computer Centre and was taken in account when we acquired our VAX computers. The Videotex experiment began in 1987 by the Bezek - the Israeli Telecommunications Utility gave us the opportunity to introduce and experiment with this service in our region. This was the bridge to our present system.

The Bezek Videotex Project

The following services are being offered online in this experimental project: News (An electronic edition of the HaAretz newspaper); Economic Information from the Tel Aviv Stock Exchange; Telephone numbers online; Home banking (query only); Shimushon - cultural activities, cinema, emergency services; Downloading of interactive games; Information on Bezek services. Additional features to be incorporated include downloading of courseware; access through Easynet to databases worldwide; telex services. An Electronic Mail Service is also available .

We made available the modems offered by the Bezek (25 modems for IBM-PC compatibles and 25 Minitels) to educational institutions in the Shderot and the Shaar HaNegev local councils; to officials of the municipalities, the Kibutzim of Shaar HaNegev and regional cooperatives; for private homes.

During this phase we cooperated with the Mehish project in Arad leaded by Dr. Elad Peled where another 50 modems were made available by the Bezek in the same experimental framework.

Soon it became clear that our expectations for the establishment of local BBS for community and educational purposes both in Arad and in our experiment could't be satisfied easily. The Electronic Mail system available allowed for only short messages to be exchanged as no facility for files transfer was available. Our intention to run local BBSs in the system were frustated as no easy enter of information provider into the system was available. These limitations lead us to search for an alternative solution.

It should be stressed that the Bezek experiment has been invaluable for creating a sharper understanding of the potential of this new media in the region.

MAKASH - Advancing Education through Computer Communications

Due to the limitations found in the videotex service we began writing an alternative software. Its purpose was to allow an Electronic Mail System with files transfer; computer conferencing; to run local BBSs and to allow easy entry of information providers into the system. When the DOORS software (fully described elsewere in this Symposium) became available and adapted to our specifications we adopted it. Since then we have outlined several projects for its implementation into national educational and community networks here in Israel.

DOORS is based on the standard packed switching networks (in Israel, Isranet) and uses them to their fullest potential. The remote personal computer dials into the network and connects with the central installation. The PC's query initiates the downloading of the desired data file which is transferred and received at full line speeds. Immediately upon completion of the downloading operation, the central unit terminates the session and disconnects the virtual communiction channel, thereby lowering communication costs to the essential minimun required to actually transfer the data.

We have established a non-profit corporation, MAKASH - Advancing Education through Computer Communications, that is the distributor of the DOORS system for educational purposes in Israel.

The Development of the Educational Concept

The conceptual basis for our project has been built mainly on the foundations laid down by the researchers working at the Laboratory of Comparative Research on Human Cognition at UCSD. Strong Vygotskian influences may be identified in this approach.

Basically this is an active learning approach: Interaction is a constructive process in which participants engage in a process of creating understandings. Knowledge is activity and development is the process of internalizing and organizing these activity patterns. The aim of the programs is to construct learning environments, through computer communications, so as to further the interpretation and understanding the students have of their world.

Dialectically we found ourselves not only dealing with educational issues but also shaping its social and economic environment through our efforts in introducing such technological innovation.

The Information and Computer Communications Center at the Negev College

The needed staff has been trained; we developed and are offering several programs in computer communications and data bases access at the P. Sapir College. These programs aim to train participants of the projects being developed and develop skills for information consumers. Both community, business and educational uses of computer communications are included. We are offering such programs both to the population and institutions in our region as to the training branches of national networks interested in establishing

national micro computer networks and make use of online services. The following programs are being offered
1. Introduction to Computer Communications in Education, Community and Business; 2. Training program for BBS's editors; 3. English Teaching aided by Computer Communications; 4. French Teaching aided by Computer Communications;
5. Computer pen pals with students at Jewish schools abroad; 6. High school students as end users of online data bases; 7. Business intelligence; 8. System seminary: Dialog; 9. System seminary: BRS; 10. Workshop for Bible Studies teachers; 11. COSTI databases.
These programs complement those being run for several years in the College on computer applications.

The Everyman's University Project

MAKASH and the Everyman's University (Israel's Open University) agreed to run a joint experiment. Several advanced courses of the University will offer day to day tutoring through our Electronic Mail system; this will complement the existing distance learning system of the University. This experiment parallels similar programs being held today in the U.S.A. and Canada.
The main issues to be dealt is the readiness of the lecturers to use the innovation; their training; the logistic problems of making accessible to the students modems and micro computers and so on.
This experiment was made possible through the fall of prices for computer communications made possible though the DOORS system.

The Training Centre at the Technology and Science Centre in Shderot

The Urban Renewal project has backed us in establishing a training centre for teachers on Computer Communications Applications to Education in Shderot. The centre is now being equiped and staffed. The first two experimental projects are a local electronic newspaper of Shderot and Shaar HaNegev elementary schools. As the children are currently working on a program aimed at deepening their contact with old people in the community this will be one of the first themes (using the proverbs exercise described in the Orillas project); the second project is to introduce computer communications into EFL studies through electronic pen pals and the skilled use of the electronic edition of the Jerusalem Post newspaper available online at the COSTI (The National Center of Scientific and Technological Information).
A teachers' workshop will be the basis for such projects and we expect new ideas and programs to emerge from it.

National and Regional Computer Communications Networks

Several national and regional networks are now considering detailed proposals we submited to them, tailored to their specific activities and aims. The proposals deal with the administrative, business,educational, social, cultural and community applications of computer communications and online databases access. One of such projects is the Kibbutz Network. There are about 260 Kibbutz communities in Israel, widely dispersed geographically but close knit both regionally and through the main Kibbutz Federations. Due to the multi faceted character of these communities all the above mentioned uses apply. We expect that beginning with the Settlements Division of the Ministry of Education schools network we succeed building a complete Kibbutz Network that will supersed the existing computer schism among the two main kibbutz mini computers families (IBM and Digital).

JEWISHNET (sm): A microcomputer educational network between Jewish centers in Israel and the Diaspora.

This project includes an international electronic newspaper of Jewish Youth;

the learning of the Hebrew language; a simulation game of the Jewish people; joint programs of studies to be carried out at classrooms of Jewish schools abroad and in Israel. These programs may give a tangible expression to the interdependence that should exist between Jewish communities around the world. We are advancing the implementation of these programs and the Jewish Education Service of North America through its representative in Israel (Dr. David Resnik) has been very instrumental in these efforts. Schools in Israel seem a little bit more comfortable with the educational applications of micro computers than their Jewish partners in the U.S.A..

Online Supply of Decision Making Aids

Dr. Itamar Gati from the School of Education of the Hebrew Universitya and the Center for Evaluation and Examinations of the Higher Education Council has developed three decision aids for career and studies choices. Later this year these programs may be made available online by MAKASH: 1. Information and simulations on chances to be accepted at the different departments of the Israeli Universities (including detailed information on prerequisites and course of studies) - LaMeida ; 2. Vocational Interests Inventory and occupational information. 3. A decision-aid based on elimination of occupational alternatives by aspects (Meshiv).

Conclusion

We are working hard in several directions to advance educational and community applications of computer communications. We expect that six months from now, at the time of the Symposium we may be able to update this report with some more details of the projects outlined here.

JEWISHNET (sm): A MICROCOMPUTER EDUCATIONAL NETWORK BETWEEN JEWISH CENTERS IN ISRAEL AND THE DIASPORA

Dov Winer, P. Sapir Regional College of the Negev, ISRAEL

Summary

The sense of belonging to the Jewish people derives from the mutual interdependencies that exist and are nurtured among its different parts. This interdependence results either from coping with external threats or from collaboration for furthering joint goals.

Processes that weaken the sense of belonging for individuals and families in the Diaspora, demand the strenghtening of the mutual relationships between its different components. This may contribute to the development of partnerships in the areas of personal interests, personal projects, training and education, friendships and family ties and, through these to the development of a sense of belonging.

The new electronic media, particularly computer networks, are instruments well adapted to this purpose. It is proposed to exploit them, through the development of educational programs and complementary activities, for Jewish community and educational centers in Israel and the Diaspora. Such programs should be implemented simultaneously and actively through a communications network of micro-computers. These programs, and the lessons to be learned from such experiments, may be the basis for further projects in other areas of Jewish life.

Modular programs are proposed in: (1) The learning of the Hebrew language. (2) An international electronic newspaper (Electronic Bulletin Board) for Jewish youth. (3) A global simulation game of the Jewish people. (4) Programs of studies on the contribution of the Jewish communities in the Diaspora to the building of the State of Israel.

Introduction

Prof. Simon Herman emphasizes the dynamics of interdependence as a determinant to the sense of belonginess to the Jewish people. He suggests that it is the feeling of interdependence that binds together Jews socialized in different environments. They are likely to accept their common Jewishness in situations where interdependence comes to the fore (Herman, 1970).

The concept of interdependence is used in the sense that a change in the state of any part of the whole affects the state of all the other parts. Related to this feeling is likely to be a sense of mutual responsibility (Herman, 1970). He distinguishes between interdependence which results from promotive cooperation in the pursuit of a common goal, and the interdependence that arises in the face of an external threat. I contend that it is through the former that the best creative powers of the Jewish people express themselves.

Processes that threaten the existence of the Jewish people have worsened lately: the distancing of individuals from Jewish life; assimilation and intermarriage; the dilution of contents; demographic aging of the people and decreasing indices of growth.

Creation, grounded on the social and spiritual needs of Jews can counteract the above mentioned processes. Increasing the feelings of mutual interdependece and responsibility are means to this end. These goals may be reached in many ways.

One way is to increase the interelationships between Jews in different parts of the world. Examples are tourism to Israel and programs of training and education that take place in Israel for Diaspora Jews.

Recent developments in the area of electronic communications and decreased prices for data transmission between computers around the world, open new oportunities that enable us to develop programs, grounded on simultaneous activities of Jews that live in different parts of the globe.

"Developments over the last decade allow people to communicate across great distances at rapid speeds; masses of information can be reproduced and distributed simultaneously throughout the world; knowledge resources can be shared, and interactions enriched by people who may never meet face to face. These technological advances also enable people to respond and pose questions directly to others around the world and conduct personalized interactions about topics of mutual interest (Kiesler, Siegel and McGuire, 1984; Collins, 1985)."

People may now ask each other questions; react to messages received; maintain personal interactions on issues of mutual interest; choose and develop partnerships for dialogues, while overcoming obstacles of distance, time and place (Kiesler, Siegel and McGuire, 1984).

"International educational networking through electronic message systems can provide a powerful new medium for education." (Cohen and Miyake, 1986).

An international communications electronic network offers an potent substratum for educational activities (Cohen and Miyake, 1986). Messages can be prepared on the micro-computer and sent at high speed using telephone lines, leaving enough time for interpreting messages and creating responses (Quinn, Mehan, Levin and Black, 1983).

Levin, Riel, Rowe and Boruta (1985) and Riel (1985) developed a students' news network based on electronic communication. Cohen and Miyake (1986) incorporated a version of this activity in the Intercultural Learning Network: students wrote news articles (in English and Spanish) and sent them overnight using the electronic network. The articles were translated by bilingual students or used as real life exercises in foreign language classes at the receiving end. In these articles students described aspects of their life, opinions, reviews, etc. to students in the other sites. Their writing became functional - directed at a communicative goal.

Such an instrument is very well adapted for wide use among the Jewish people for nurturing significant activities. We suggest that an experiment be conducted, so that we receive the necessary educational experience in the use of micro-computers communications in a global scale. The lessons learned will direct us in widening the applications of this new medium.

MAKASH - The Shaar HaNegev/Shderot Community Videotex Program

A computers communication program is currently being implemented in the Shaar HaNegev/Shderot area.

The VAX computers in the Shaar HaNegev Campus were acquired as part of a masterplan for the establishment of a Videotex network in the area. The opportunity of a linkage with the experimental videotex program of the "Bezek" - the national telecommunications company, arose.

In this experiment the following services are being offered: news (the HaAretz newspaper), commercial bulletin board, information on phone numbers, the "Bezek" services, online information from the Tel Aviv Stock Exchange,
home banking (query only), downloading of interactive games and electronic mail.

The participants are educational institutions, private homes and officials at the Kibbutzim of the area and the Shderot development town.

The limitations of this electronic mail facility for educational applications lead us to write the outline of a complete Hebrew/English electronic mail and conferencing system; we feel that only providing unsophisticated information providers access to the system we could hope a wide penetration in the educational area. Such software (DOORS) has been developed and is now being distributed in the Educational and Kibbutz networks in Israel through the MAKASH non-profit corporation we established.

We should stress that in this region we have concentrations of olim (immigrants) from the U.S.A., France, North Africa and Latin-America as well as Israeli born people . They make wide use of the facilities of the P. Sapir Regional College and other community and educational institutions in the area. These persons have international interests ranging from the export of commodities and know-how to a deep commitment among many of them to Jewish affairs. This is one of the foundations of the present initiative.

Computer Communications in the Jewish Communities in the Diaspora

In the countries where the big masses of Jews of the Western Diasporas live are switch-packing data transmission networks. They provide reliable services at high speeds and low costs, and permit the interconnection to the international electronic messaging systems.

The U.S.A. and Europe have several such networks; but they exist also in other countries as well: Argentine (ARPAC); Brazil (RENPAC, INTERDATA); Chile (CHILEPAC); Australia (MIDAS); South Africa (SAPONET).

All that a micro-computer user needs to connect himself to the international network is a modem, software and communications card, and a telephone line. The price of such a package in the U.S.A. in 1987 was about 500 US$. The cost of the communications, in a project held between schools in the U.S.A. and Australia, was 25 Australian Dollars per month in the Australian side and 12 US$ per month in the American side (see Butler and Jobe, 1987).

International Electronic Messaging as a Educational Instrument

Levin and Riel (1985) caution us by observing that the mere presence of a computer network does not create an educational environment. Students need a series of activities in which their interests converge so that they can expect relevant gains from such interaction. Teachers also need a clear understanding of how the networking could fit into their plans to achieve educational goals.

Cohen and Miyake (1986) based their experiment in intercultural education on a functional learning environmnent approach.A functional learning environment is a well defined context that focuses learners' attention and motivates learning and performance on tasks instrumental to the achievement of explicit goals. These contexts can be real or simulated settings that operate as models of larger, more complicated or more diffuse realities. The students see the instrumentality of the task to achieving these goals. The formulation of the goal need not be originated by the student but it must be accepted as something the student wants to achieve (QBLCHC, 1982; Riel, 1985).

"The potential value of international educational networking seems very extensive. It opens the opportunity for using the world as an instructional laboratory for language arts, foreign language, science and social science, in which students can study such varied subjects as expository writing, cultural traditions, astronomical and geographical phenomena. These topics become tangible subjects of study when students interact from one site to another. The purposeful use of foreign and local language as well as systematic methods for gathering and reporting findings become a real life necessity for the students when comparing the data from different locations. Cultural differences and similarities, international politics, contemporary history and issues of human geograhy are also obvious topical areas that can be enriched by cross-cultural inquiry projects. Students can get first hand impressions on the human side of economical and political news, learn about norms of behavior, traditions and values in different cultures and explore
norms and values in their own culture." (Cohen and Miyake, 1986)

Cohen and Miyake (1986) suggest the accomodation of both highly structured activities as well as activities with almost no preliminary structuring. A progressive approach is suggested, where new participants start by joining projects that require loose coordination. Later, when accustomed to the new technology they can participate for example in an inquiry project requiring more coordinated interaction.

Modular Programs for Jewish Schools in Israel and the Diaspora

Below we suggest some modular educational programs, that we intend to run, using a computer communications network.

1. The Learning of the Hebrew Language

The Hebrew language is taught around the globe at various levels and in different frameworks. From Bar-Mitzva lessons, through the Sunday Schools, full time Jewish schools and the universities, for Jews and non-Jews alike.

There is a perfect fit between the technology of computers communications and the needs of students of a second language. Students in bilingual education programs need authentic contexts for writing if they are to develop and maintain basic literary skills. Foreign language students need authentic contacts with native speakers and much practice in a range of language skills - including reading and writing - if they are to develop cultural awareness and communicative competence. Computer networking can help meet these needs.

Sayers and Brown (1987) describe the project Orillas, that links classes in Mexico and Puerto Rico with bilingual classrooms of Latino students in the United States. The goal is to improve student educational achievements - especially writing skills - both in the United States, where Spanish is a minority language, and in Mexico and Puerto Rico, where it is the dominant language. The project includes many pairs of "sister classes". Communication is accomplished exclusively through writing. Word processors are used to plan, compose, revise and edit text, and telecommunications is used to send the text quickly to faraway readers. Writings are exchanged by posting them on an electronic bulletin board program. Every afternoon, from Monday through Thursday, the Orillas teachers leave their computers connected by modem to a phone line. The next morning when they arrive at their schools, the classes read, save on disk and print out the "mail" that was delivered overnight. Using this technology, students write much more than with regular pen-pal letters. One of the projects that evolved was an investigation of proverbs. Students also involved their families: key facts about each proverb - such as when grandmother used it and what she really meant - were typed into a data base. Comparisons of proverbs by theme and context were made by students in both sister classes. The final product of this activity will be a bilingual book of provebs jointly produced by the sister classes.

Similar projects are described by Butler and Jobe (1987), Colborn (1987) and by Riel (1987).

Concentrations of Israelis abroad allow for such programs to be held between native Hebrew speakers who visit Israeli schools abroad and in Israel. Also, advanced classes at Jewish schools in the Diaspora are natural candidates for such "sister classes" projects.

Programs in Hebrew demand that such classes be identified. The training of teachers can be done by different technniques: in concentrated seminary training, in writing or through video clips or computer communications. The apropriate background material should be edited and published.

In the case of Spanish, communications software, with the special characters needed to communicate in writen Spanish, are in the public domain and can be gotten almost free (FR-ED-Writer and FR-ED-Sender, Sayers and Brown, 1987). The DOORS software has solved such problem for the Hebrew.

2. A Global Electronic News Network of Jewish Youth.

A few international electronic news networks of students are described by Cohen, Levin and Riel (1985), Levin, Riel, Rowe and Boruta (1985) and by

Cohen and Miyake (1986).

Riel (1985) describes such a project called the InterCultural Learning Network. Students begin their participation by exchanging "cultural packets" containing tokens of important aspects of their lives. The examination of these packets leads to discussion of the similarities and differences in their lives. The packets have included such things as annotated TV guides; samples of home and school work; baseball cards; school identification cards; train schedules; pictures depicting sports, musicians, fashions and food; photographs of the students and their surroundings; postcards of cities and attractions; coins and stamps; and descriptions of school, community and country.

Students at all sites become reporters for the International Computer Chronicles Newswire. Writing for the ICCN provided the context for sharing important aspects of their daily life. Their writing being purposeful is aimed at a real public composed by peers; it becomes functional and communicative. (See examples in Appendix I).

We propose the establishment of such a network, whose nodes are Jewish centers around the globe: schools, Sunday schools, community centers, synagogues, Jewish clubs and youth movements.

3. A global simulation game of the Jewish people.

The renowned Dutch historian Joan Huizinga (1938) defined a game as: "...a free act, not meant seriously, commited consciously and outside normal life, nevertheless capable of involving the player completely, without material gain, taking place within a stipulated time-span and area, according to rules, evoking strong human relationships and preferably surrounding itself with secrets and disguises and other ways to accentuate its distance towards everyday life."

Since this definition was proposed the field of structured games and simulations has expanded and diversified. Today they are used as research instruments, as instruments for political and military decision making, the collection of scientific data, the development of creative thinking, and many other applications (See Bruin et al. 1979).

As an example of a global simulation game we have the "Inter-Nation Simulation" developed by Guetzkow and Cherryholmes (see Gilboa, 1983) that has already taken place several times with the participation of students of International Relations, Political Science and Economics from several universities around the globe (Europe, U.S.A., Japan, Australia and Israel) using the international computer network.

As the game starts the Director provides the participants with information on the resources, political organization, military strength and population of the participant countries .Using this information, the leaders (administration) of each country plan their goals, strategies and activities in progressive steps. The participants reported that they: (1) developed a feel for the world like that of government officials (2) it was easier to understand the inter-nation system this way than the complex system they read about in the newspapers and books (3) they acquired skills for analysing and understanding essential elements of the international system through the analysis of similar components in the model.

A seminar was held this year for the second time, in the Shaar HaNegev high school with the participation of 11th graders from this school and the Regional Religious high school Yavne. At the center of the seminar was a simulation game. In the first year the theme of the game was "World Jewish Congress"; this year it was "The Israeli Society". The preparations for the game included the crystallization of mixed teams of youngsters from both schools, without any connection with their personal political and social views. The teams represented left and right, Jews and minorities (Arabs, Druzes), religious and secular groups, political parties and extra-parlamentary groups. Also a press team was formed that produced cable t.v. programs and mural newsppapers during the game.

The teams initiated and participated in a series of events of active learning, with high involvement at the individual and group levels. During the game itself, new ideas were suggested, oportunities considered and many situations and pieces of information that generally are avoided, were taken in consideration for the teams' decisions.

These simulation games were very successful: "...the youngsters were very active, there was an atmosphere of euphoria..., The relationships between the teachers, kibbutz members and town dwellers, religious and secular, were very informal and respectful and this was transmited to the students..." (Luz, 1987).

One of the activities to be developed and run using the JEWWISHNET (sm) computer communications network is a global simulation game of the Jewish people, with the participation of Jewish youth around the globe. The summer activities held annually in Israel allow for combining face to face activities with those held through the electronic medium.

Such a game will strenghten the consciousness of unity of the Jewish people and the commitment of the youth to its present and future. The problems to be considered during the game may help in sharpening the sense of mutual dependence among the different segments of the Jewish people.

4. A research-based program of studies on the contribution of the Jewish communities to the building of the State of Israel.

A concrete expression of the mutual dependence between Jews over the world can be found in the contribution of the Jewish communities to the building of the State of Israel.

There exists a tendency to see this contribution restricted to the financial contributions and the periodic volunteering. However, the contributions that result from the Aliyah (Immigration to Israel by Jews) and the cultural creation derived from particular communities should be emphasized: for example in the settlement of the country, in the arts, literature, music, science. This involvement of the communities in Israel and of Israel in the communities are an important factor in keeping Jewish life in our generation.

In Jewish education, Israel is a source of inspiration and proudness, a focus of identification, and a source of a feeling of security. In a dialectic way, the visits, contributions, envoys from Israel and the Aliah from the Diaspora - all these contribute to a Jewish continuing existence - both there and in Israel.

I suggest that programs of study be developed adapted to the different Diasporas. Their aim should be to bring the students, both in Israel and in the specific community, to a joint knowledge of the history of the community and its role in constructive Zionism. This may lead to a lively learning of contemporary Jewish history and to mutual commitments for the development of Jewish life both in the community and in Israel.

A computer network fits very well with such program. Paired teams, in Israel and the Diapora, may develop mini-research topics such as:

* Acquaint themselves with the history of the community and the settlement(s) it established in Israel like "American Jewish settlers in Eretz Israel...". * Israel as viewed by the youth of London ... The Jewish community of Holland as viewed by the youth of Kyriat Shmona. * The Jews of Marrakesh in Israel. * The Latin-America folklore in Israel - and the Israeli folklore in the Jewish communities of South America.

The joint and comparative mini-research projects that will evolve from such activities may be of sufficient public interest to be published afterwards in different languages.

A detailed Syllabus for such program for the Brazilian Jewry has been developed.The students may develop one of the many subjects suggested through interviews with people that have taken part in these events; consulting books, newspapers and documents; dialogues and mutual questioning.

THE INTERACTIVE COMMUNICATION SIMULATIONS
ACTIVATING THE POTENTIAL OF INTERNATIONAL NETWORKING

Clancy J. Wolf, Israel M. Porat, The University of Michigan, U.S.A.

"The technological revolution appears to be sweeping around schools, leaving them virtually untouched, even while purchasing microcomputers is becoming the 'in' thing for school districts to do." Such was the conclusion of John Goodlad in his 1985 book: *A Place Called School*. Goodlad, as well as others, pointed out that, while the potential for the use of computers in educational settings had be described, it was not being realized.[1] With the introduction of the Apple II computers in the mid to late 70's, the technology was readily available to every school district. Schools purchased thousands of computers believing that they had found the ultimate teaching machine - one that could address each individual learners' differences. Tutorial software was written and computer labs were set up in most schools. Today, over ten years since the introduction of affordable microcomputers, educators are still asking themselves "what are these machines really good for," and "how can we best use this technology?" There is a promising trend developing towards using software referred to as applications or production tools where students use the computer as a tool that helps them with processes and follow guided procedures rather than providing canned instruction.

There is a new technology today pulling another bandwagon that schools and districts seem to be hoping on - telecommunications. The April 1988 issue of *Technological Horizons in Education Journal* is devoted entirely to Networking and Telecommunications.[2] A brief look at the table of contents tells us that the articles have names such as: *Introducing Teachers to Telecommunications*, or *The Basic Principles of Telecommunications*. Similarly, in March at the Michigan Association of Computer Users in Learning annual convention there were dozens of sessions where educators from around the state and nation talked about *How We Set Up Our District Bulletin Board* or *Telecommunications: How to Get Past the Hurdles*. The tendency seems to be to describe how to set up the computer and equipment and what sort of problems people encounter in doing so. We face a similar trap as when computers themselves were first introduced: people can see that there is potential, or that there *should* be at least, but they aren't sure exactly how to realize that potential. A large majority of articles addressing the subject of telecommunications in the classroom deal with the technical aspects of *how* to do it, with very few educators talking about *what* to do, and even fewer addressing the very real issue of *why* should we, if we even should, use this technology.

To telecommunicate from a school it is necessary to have certain equipment at your disposal. A computer, modem, telephone line and communications software are all essential. Virtually every microcomputer available in the U.S. is adaptable for telecommunications. This is about as far as most of the discussions extend, only in more detail about the various ways of getting into the conference room, different ways that the conference room can be arranged, and specifics of the different systems.

The electronic meeting room described above is furnished not with tables and chairs, but with huge bulletin boards. The boards are highly organized with messages sorted by topic, date, school, etc. *How* these messages are actually used will determine what these systems can be used for in schools. One scheme provides for three major categories of activities for which computer conferencing has been used in the classes: communicative, administrative, and media-dependent activities.[3] A group of educators in Guelph, Ontario have divided the communicative and administrative uses into ten finer categories.[4] The most unique to this medium, and possibly the most exciting for educators are those activities based upon features of telecommunications that would be difficult to perform otherwise - the media dependant activities.

The purpose of this paper is to consider one option regarding the question about *what* to use telecommunications for in the classroom, and within the framework of that option discuss observations as to *why* we should consider it - what does it really do?

The Interactive Communication Simulations

The following scenario is from a typical American middle school participating the Interactive Communication Simulations (ICS) programs at the University of Michigan. For the past four years, the ICS program has been offering a variety of activities for students at middle and high school levels that are mediate through computer conferencing.

> Mary hurried to school the other day because she wanted to find the results of the test she was running to determine the level of Coliform bacteria in the river where she and her friends go windsurfing. She knew that the results would be ready and she could finally gain closure on her argument with Juan. Juan had indicated that it would be very unhealthy for Mary and her friends to actually go swimming at that location because,

---

[1] Goodlad, John, *A Place Called School*. New York: McGraw-Hill Book Company, 1984, p. 340.

[2] *Technological Horizons in Education*, Vol. 15, No. 8, April 1988.

[3] Wolf, Clancy J. *Confer in the Classroom*. The University of Michigan, 1988.

[4] McCreary, Elaine K., and Judith Van Duren (University of Guelph), *Educational Applications of Computer Conferencing*. Prepared for the Association for Media and Technology in Education in Canada, York University, June 15-18, 1986.

although coliform bacteria themselves are not pathenogenic, they are an indicator of other bacteria that could be present, and harmful to humans.[5]
While Mary was counting the colonies of bacteria, Ehana and James were busy preparing arguments over who had more constraints on their political actions: the United States Secretary of State Caspar Weinberger or the Syrian Arab Republic's Foreign Minister Farouk al-Sharaa. Ehana maintained that al-Sharaa has many more constraints due to the relationship between Syria and it's immediate neighbors.

Mary and Juan were involved in monitoring their local streams and rivers and shared their results with hundreds of other students in over fifty different schools. Ehana and James were participants in the Arab-Israeli Conflict exercise which has them play the roles mentioned, as well as seventy other roles at various schools, and explore the complexity and limitations of international politics. Mary and James are class mates at a school in the suburban sprawl known as Greater Detroit, while Juan attends school in West Germany and Ehana goes to school in a small town in Colorado. This network allows students in any location to work cooperatively on a variety of activities: Arab-Israeli Exercise (social studies), U.S. Constitution Exercise (social studies and government), and Water Monitoring (environmental sciences), and the Environmental Decisions Simulation. Although most have some sort of role playing component, the most obvious commonality is the computer mediated communications.

The Arab-Israeli Conflict Simulation

The Arab-Israeli Conflict Simulation has been the mainstay of ICS for the decade and a half of its existence, both at the secondary school and university levels. Beginning at The University of Michigan during the 1973-74 academic year, the Arab-Israeli simulation has been mounted many dozen of times, both as face-to-face and computer-mediated exercises. At the university level, the Arab-Israeli simulation has been one among a number of subject matters that have been addressed by means of the ICS format. Nevertheless, it has represented the great majority of such exercises. Most have been of a face-to-face nature, but five during the late 1970's were computer-mediated and served as the arena in which the synthesis between the ICS-type simulation and CONFER was tested.

At the secondary school level, the Arab-Israeli simulation was the only ICS exercise offered from 1984 through the Fall Term of 1986. All Arab-Israeli exercises have been computer-mediated, as now are all ICS endeavors mounted from The University of Michigan.

The Arab-Israeli simulation has been the model on which the great proportion of the evolutionary development of ICS has taken place. Indeed, the Arab-Israeli exercise is in essence the basic format of ICS. The 55 roles represented in the current simulation are organized into 11 country teams. Seven of these represent states directly or indirectly involved in the conflict. Four represent parts of political entities that are also involved, but which are better organized as more than one team due to the nature of the political reality they represent. Generally each team is located in a different school so that all diplomatic communications are mediated via computer.

All of the roles represented in the simulation are very high level governmental or political figures. With but a very few exceptions--the "Private Envoys"--all are also the actual individuals currently holding the offices represented. Therefore, the simulation is based on the highly dynamic, and dramatic, context of the current reality. Abstraction and generalization is thus far removed.

The participants in the simulation are involved in three basic forms of activity, in addition to being participants in the domestic political and governmental affairs of the country teams within their own schools. First and foremost among these computer-mediated activities is the sending and receiving of private diplomatic "Messages." Each participant has a subset of a half dozen or so foreign figures with whom such messages may be exchanged. The "Communications Matrix" that this represents has three purposes: to help participants more closely simulate the real world, to help them focus their attention and activity, and to help distribute the diplomatic work-load among all participants on a team. The second activity that participants are involved in is the sending and receiving of "Press Releases," the medium through which they make public pronouncements. Finally, the participants, being high level political figures, can take political, economic or military actions by means of "Action Forms." All of this activity is mediated in a variety of ways by a "Control" group located at The University of Michigan.

U.S. Constitution Simulation

The United States Constitution Simulation represented a bold new departure for ICS when it was launched in the Spring Term of 1987. The exercise is one in both American history and United States government. Therefore, it fits directly into the core of the secondary school social studies curriculum.

The simulation follows the ICS format. Participants role playing real world individuals are organized into teams each of which is located in a separate school. The 70 roles in the exercise are delegates to a constitutional convention in the near future. All are historic figures drawn from across the past 200 years of American history. They are organized into fourteen delegations of five persons each: generally they include one person from the constitutional era of the 1780's, three 19th century political figures, and one more or less contemporary 20th century political actor. Each delegation represents a grouping of individuals with a similar orientation toward constitutional matters.

---

[5] Mary's work with Juan resulted in the city of Ann Arbor posting a sign at her windsurfing pond. This sign can be locked open or closed depending upon what the water conditions dictate. Through the cooperative efforts of these and other students, a City Park Ranger now knows under what conditions this sign should be opened to warn the public of the health hazard.

The basic working forums of the simulation are five 14-person drafting committees, each of which has as its responsibility the drafting anew, modifying or readopting of appropriate articles addressing a particular basic area of constitutional concern. These computer-mediated committees are composed of one individual drawn from each of the different delegations and, like the delegations, are composed of an historic mix of figures.

Decision-making is an important element of the exercise. A majority or minority of committee members may send draft articles to the floor of the convention at any time during the proceedings. Once on the floor, voting takes place by delegation, each of the fourteen delegations having a single vote. This system of voting mirrors that of the 1789 convention and is managed by a computer program. It is designed, however, to encourage delegates to negotiate with one another about the details of each draft and the positive and negative impact that changes might make.

A constitutional framework, perhaps especially in the United States, is intended to be an enduring document, politically relevant to generations whose economic, social and cultural contexts have little in common. An historically constructed convention attempting to draft such a document should provide a dramatic setting for its delegates to confront directly a broad range of constitutional matters and the very essence of constitutionalism in its historical and political context. This is the educational intention of the ICS United States Constitution Simulation.

Water Monitoring

Mary's involvement was through the project titled "Water Monitoring in Local Rivers and Streams." The project required Mary and her classmates to learn and conduct nine different tests on the water in a local river.

First, Mary and her friends spent time in class learning how to conduct the tests. Most of the tests require adding some chemicals to a sample of water and shaking the solution until it turns color. The richness of the color indicates how much of that particular parameter is present. A few of the tests use the school's microcomputer as a device to measure the concentration of the parameter. A variety of probes are connected through a circuit board to the computer, and a program helps them run the tests. It is from one of these tests that Mary was so anxious to obtain the results.

Once the raw data is collected, the students need to analyze and interpret the meaning of their results. Again, the microcomputer is used as a tool to accomplish these tasks. First, as a communications device, the class sends their results over the telephone to a computer based network centered in Ann Arbor. Through this network, they are able to obtain the results of other classes running the same tests at other sites along the same river, as well as several sites on other rivers located throughout the country and the world. A total of over fifty schools are involved, representing several different rivers from the Rhine in West Germany, to the Platte in Colorado, to the Geelong in Australia, with several in between.

With test results in hand, the students enter the data into a database they are maintaining on their microcomputer. The database allows them to search for subsets of data and focus their attention on specific parameters, streams or dates. Once the specific data are identified, a graphing program is used to generate line graphs and bar graphs which might show trends or specific problem areas.

If an incongruity surfaces from the data analysis, students will focus their attention on that anomaly. A more intensive sampling program might be instituted, or simply a closer look at the sampling site. Often questions arise that require more information or clarification from the other schools. Messages and public statements are exchanged between the schools making the entire network one large cooperative investigation. In the anecdote used to open this discussion, Mary was a student in Ann Arbor while Juan was a student in Heidelburg, West Germany.

Students are encouraged to seek solutions to the problems that they identify. Professionals from the water monitoring and water supply industry are also members of the computer network, acting as resource people to the students. Members of the U.S. Environmental Protection Agency in Denver and representatives from the South Eastern Michigan Council of Governments (SEMCOG) are amongst those currently offering their information resources.

Environmental Decisions Simulation

The water monitoring project has evolved into an exercise called the Environmental Decisions Simulation. Students role-play 40 prominent citizens of the world community, drawn from a broad variety of backgrounds and historical periods. These individuals have been asked by the World Bank to examine the environmental impact of a huge dam that the government of Zaire proposes to build on the Congo river. They are organized into eight five-person Delegations, each of which represents a particular orientation towards environmental matters.

The benefits from building a large dam range from ensuring supplies of potable water (a critical consideration for the majority of third world countries where unhygienic water supplies are a major cause of disease) to creating jobs and controlling floods. Most important, however, is the potential in ensuring future economic development by supplying hydroelectricity for power and water for irrigation and greater food production. In addition to benefits, large dams also have the potential to create various problems. Engineering mistakes and operational errors, severe social disruption, the spreading of disease, the elimination of forests and significant wildlife habitats, the destruction of estuaries and endangered species, and even the ruination of the very land designed to be made productive are among the possible adverse effects.

The 40 Delegates are organized into five Standards Committees, each having representatives from every delegation or school. These Committees are to concern themselves with different areas of possible environmental impact: water, society and culture, agriculture and fisheries, forests, and development. The Committees are to examine the potential positive and negative impacts - social, environmental and economic - of the dam on their particular area of concern, as well as ways in which such impact might be ameliorated. They are also to consider possible alternatives to the proposed project and their possible impacts.

A variety of activities closely associated with the simulation may be conducted within individual schools. For example, students may be asked to research and report upon local environmental decisions and actions that have been taken. This could include initiatives such as hardware stores giving away weatherstripping, the building of an unusual greenhouse/solarium, the availability of new energy efficient refrigerators, or other case studies involving both large and small scale efforts to do something about environmental concerns. Subsequent editions of the Environmental Decisions Simulation notebook provided for the exercise will include activities of this kind submitted by each year's participants.

What Do These Offer to Education?

The ICS exercises don't come with a list of skills for students to master in some arbitrary sequence designed by some unknown author - they don't really list the skills at all. These activities don't come with lists of questions to test student learning, and teachers do not receive sets of ditto masters for quizzes, tests or worksheets. What is provided is a wealth of background information on the people and the issues that will be addressed, explicit instructions on how to use the computer and conferencing system, and a notebook giving each teacher suggestions for how to integrate a team into a regular class with specific topics for discussion.

Why should a classroom teacher who is already overburdened with large classes, numerous preparations, mandated course requirements, and state tested reading objectives be interested in these programs? When so many districts place an enormous emphasis on standardized test scores and our public critics cry out for "back to the basics" curricula, should district and building administrators buy into these programs? When money in education is tight, why should a principal or parents pay for a modem, telephone line, or participation fee for a school to engage in one of these simulations?

To try to get answers to these questions and others that would arise, we interviewed several members of the ICS community. On the teacher side, there were three sets of interviews: a pair of interviews with a teacher in his first year of participation in the water monitoring project, three interviews with a teacher who has had several of her classes participate in both the Arab-Israeli exercise as well as the U.S. Constitution exercise over the last four years, and a group of ten teachers who had all been involved in the same U.S. Constitution exercise. To get the student's perspective, we met with and discussed their experiences with two middle school students from the Arab-Israeli exercise, two high school students involved with the U.S. Constitution, and a class of ninth graders involved in the water monitoring project. In addition to these sessions, we have reflected comments and insights provided by the university staff and students involved in running the exercises as well as the written records of some past exercises.

There are four major categories in which most of the observations can easily be classified: effects on students, effects on teachers, effects on the institution, and effects on others associated with the exercise.

Effects on Students

The fact that students in grades six through University level can hook up to a teleconferencing network and communicate with other students from as far away as Western Europe or Australia creates a potent image. This concept becomes even more powerful when considering the depth and scope of the material they are communicating about. These students aren't copying answers out of the pages of a textbook, instead they are creating their own text.

If we examine the activities that students engage in during the course of these simulations, we see text production activities: reading comprehension, oral discussions and original writings. As one facilitator said, "Inherent in the design is an opportunity for students to engage in meaningful, relevant reading and writing experiences." There is a purpose for their reading and a real audience for their writing. By participating in the exercises they are not merely reading about history, water quality or international politics, they are drafting their own constitution while living the roles of historical figures, monitoring their own water supplies, or becoming world leaders who draft peace plans, plan military actions and conduct world trade agreements.

The following two examples illustrate the changes in the quality of text generated by the same student over a span of four weeks.

```
Message 25
MESSAGE from: Gorbachev Ussr2              09:23 Mar11/88 MACK:SU2
HEADER: TO NASIR WEST BANK2?
DEAR FRIENDS,
     I,MIKHAIL GORBACHEV,AM FOR TRYIMNG TO FIND
PEACE FOR THE PALESTINIANS.WHAT CAN I DO FOR YOU?

                                   SINCERELEY,
                                   MIKHAIL GORBACHEV
```

```
Message 2014
MESSAGE from: Gorbachev Ussr2                09:34 Apr06/88 MACK:SU2
HEADER: TO RABIN ISRAEL1?
To: Rabin (Israel)
From: Gorbachev (USSR)

Dear Minister Rabin,
In regards to your request for the refusniks, we will discuss this
issue at the conference we have been trying to assemble.  Everyone
has agreed to come except your small nation.  We have been
awaiting a definite response from your Prime Minister for a few
weeks.  The PLO has even discussed the issue of recognizing Israel as
a nation.  Without your presence, only increased tensions will
result.  I am currently working with President Reagan to ensure a
productive round of talks.
In regards to this oil-embargo, it was an idea presented by Arafat a
few months ago in response to the brutal slayings of his fellow
members.  He has decided to cancel his plans only if Israel attends
the conference.
              Awaiting your response,
              Mikhail Gorbachev
              General Secretary of the Union of Soviet
              Socialist Republics
```

Part of the difference can be attributed to becoming familiar with the technology, but that only deals with the appearance of the text on the page. Even a cursory examination reveals however that the structure of the writing itself and the level of sophistication has changed tremendously. As one student put it, "It gives us a chance to really structure your arguments logically and make sure that its consistent, as opposed to letting our emotions fly by. I think its a good learning tool." A political science professor from a small liberal arts college captured the competency of the students with his statement, "I wish *my* students could write and speak as concisely and had as inciteful comments to make as the high school students I've been watching."

A second major impact on the students, and also to the teachers in this case, relates to the opening quote by John Goodlad. The students are in the midst of a technological society in a time that has been called the technological revolution, or the information age. While many people are overwhelmed by the changes, or even oblivious as Goodlad implies, the students in the ICS activtites are using the technology for their own purposes, not being swept around by it. The students are not in a computer room, studying computers as a subject, nor are they using disks of software to study parts of speech or facts about their subjects. They use the computer as a means of preparing their arguements, and communicating their own original, relevant, meaningful ideas to their peers.

"I knew nothing about computers - very little about computers - and I feel computers are important and *can* be used in subjects like social studies. This (simulation) gave us a chance to learn how to use the computer, interect with it, and use it to our advantage which otherwise I would not have done." While many students have had little exposure to computers prior to the exercise, most finish the activity feeling comfortable in using them as tools. In the schools where the computer remains in the classroom, even when that class is not activily involved in an ICS project, teachers report that the students continue to prepare assignments using the skills they learned preparing text for ICS - without being prompted by the teacher.

Changes in writing styles and learning to manipulate technology are both outcomes that fit into the traditional curricular goals of schools, and are often used as arguments by teachers to obtain funding or permission for their classes to become involved. Possibly the most important changes that occur to students, however, deal with the social structures within and between individual classrooms. Individual status, overall structure of the group, and how groups interact with other groups are just a few of the social characteristics that are modified extensively.

Individual student roles can abruptly shift, usually assigning much more status to those who have knowledge or expertise in areas where most of the students have little background. Overnight the "computer nerd" becomes someone who everyone likes and wants to work with. While this may be insincere at first, motivated by a need to get something done on the computer and this person possesses the skills that allow that task to be accomplished, once the students work with each other, they lose track of the previous prejudices.

One of the "computer nerds" explained that he had missed a large block of school due to an illness a few years earlier. When he came back, everyone had friends and he did not fit in. As a consequence, he became interested in computers which met a lot of his needs regarding leisure time activities. As he describes it, over the next few years, he became more and more interested in computers while the other students became more and more content to ignore him. Once the class became involved in the simulation, overnight he became a desirable friend. As time went on, the other students realized that he wasn't different from them - just that they didn't have a common history to share, or more important, they just didn't know they did have a common history. This young man explained how he almost broke down in tears when one of the other students asked in all sincerity, "where have you *been* the past two years."

A second manifestation of the changes of interpersonal relations within the clasroom is a result of the role-play aspects of the exercise. Students are assigned, either through self selection or teacher assignment, roles which they wil play. The nature of the exerises provide a social structure within the roles, that is, one role is the head of state, while another may be "only" a reporter. It would be difficult to match the existing heicrarchy amongst the students with the hierarchy amonst the roles within a classroom, particulalrly when there may be three students working together to play a single character. Friends often play characters on a team that have nothing in common, allowing more time for interaction with other members of the class. Friends also end up playing characters with strongly opposing views, providing a forum for debate that generally gets to fundamental issues of human nature - civil rights, environmental issues, religion and what's "fair." The artificial characters allow students to explore such issues without concern for the images they have so carefully built up for their own status, they can always say "Hey, it was how I (we) had to play my (our) character, not the way *I* think."

A similar mask is present when students communicate between schools. Throughout the exercise, the students do not sya who they really are, or where they live. The schools are aware of the variety of locals involved, but they don't know who is where. As a consequence, they build the mindset that they are talking to Yitzhak Shamir or Elizabeth Cady Stanton.[6]

While students within a school often use the excuse mentioned above that it was my role, not me, this excuse has seldom bee expressed from one school to the next - at least not until the debriefing period when the characters are unmasked. Students are free to explore alternative viewpoints without suffering shame or loss of status due socially incorrect actions or consequences. They simply don't have any status of their own until the debriefing, and at that point, it seems to be based upon how they presented their case as opposed to traditional social factors such as race, sex and age. A particular example demonstrates this point.

Until recently, at the end of the exercises students would travel to Ann Arbor for a potluck dinner and face-to-face debriefing.[7] At one such potluck a young man was very interested in meeting another character with whom he had been working for the last two months. The young man was from a fairly wealthy, all white town in Michigan, where he was a football star and academic leader. He was to graduate from High School that year and this was the first time he felt he had met his intellectual equal. Every time a new school arrived, he was quick to find out if this was the delegation that included Prince Fahd.

Prince Fahd's school showed up a bit late and finally claimed their seats. The school, a middle school, was from inner city Detroit and all of the students were black. To stay in role, they had all worn burnouses - the traditional Arab headgear. Many of the students from the other schools became restless and uncomfortable - possibly feeling embarrassment for these new arrivals - not because of being late, but because the headgear were really just towels with headbands keeping them on. One student even had a Holiday Inn towel with the tell-tale green stripe and logo running it's length. To top it off, the "girl" wearing the Holiday Inn towel was the youngest, about ten years old, and *she* was Prince Fahd.

We were already aware of the young man who was excited about meeting Prince Fahd, so we watched his face as he realized who she was. Looks of shock horror and confusion flashed by. We asked him later what had gone through his mind. He explained that his knowledge of the intelligence of this individual through previous communication was at odds with what his gut was telling him she should be like from her appearance. Yet, by the end of the afternoon, the two were arguing international politics as equals, and the class with burnouses had been totally assimilated into the larger group. The young man admitted that he would have to be more careful on how he judged people in the future, and Prince Fahd concluded that "some of those rich white kids aren't as bad as them seem."

While this is an extreme case, every student we spoke with explained that they realized that people are different, and that is okay. The ability to accept a variety of viewpoints, or at least not to dismiss them summarily simply because of the source, is a difficult skill to teach, yet most of the students involved appear to be developing this ability.

A similar form of interpersonal interaction that shows up in students involved with the ICS activities is the feeling of community that develops. As mentioned earlier, students will frequently work in small groups of two or three to play a single character. In addition, within a team of five to ten characters, their activities and success are directly linked to the success of their classmates. They develop a very cooperative attitude in their actions as well as thinking.

One way this surfaces is in they way the students speak about their involvement in ICS. All of the references to activity use plural pronouns such as "our", "we", and "us" instead of the more egocentric singular forms "my", "I", and "me." This appeared over and over, in many situations where the singular would have been as appropriate, and even expected. The comment quoted earlier that, "this (simulation) gave *us* a chance to learn how to use the computer, interect with it, and use it to *our* advantage which otherwise I would not have done," is representative of the student comments.

---

[6] Identification with the roles becomes extreme. One student playing George Shultz, tried to contact his teacher one evening to get the password so he could send a message from home. The teacher was not home, but there was a message saying that if it was important, her husband could be contacted at a given phone number. In this student's mind there was nothing more important than his need to send that message so he called the number. Unfortunately, the husband, who was called out of a General Motors board meeting to speak with George Shultz, did not have the password, so the message had to wait until the next day.

[7] These were cancelled for two reasons. First, with more and more schools being far from Ann Arbor, there was and equity issue in hosting an activity that only part of the schools could be involved with. More importantly, however, was that the schools that debriefed in Ann Arbor, generally did not participate in the computer mediated debriefing, degrading the quality of the debriefing for the rest of the schools.

This move away from an egocentric view extends to their conscious reflections of the activities, too. Students will volunteer to act as advisors to future teams to "help them learn better." One young woman made the observation a few weeks after the exercise ended that "some of the other ICS people and I agree that it's actually lonely without ICS."

Effects on Teachers

The role of the teacher in the ICS activities is very different from the traditional role of teacher as the source of information. In the ICS environment the teacher acts more as a guide to help the students explore the issues and their own interpretations of how the characters would address the issues. Teachers are not expceted to be experts in he subject matter - that is provided by the University in the form of notebooks as well as constant supervision by undergraduate and graduate students from the respective subject areas. The term "teacher" is not even used by the ICS staff, being replaced by facilitator, which quickly becomes used by the teachers themselves.

Many teachers experience frustration in their iunitial involvement with these activties. There is an incredible abount of new information and skills that need to be acquired. If the teacher is to maintain the tradition role of complete control over all aspects, they must master three computer systems (word processing, telecommunications and the conferencing system), as well as the subject matter, and probably could use several more hours in a day. The following was provided by a faclitator describing their daily routine:

> At our school the Social Studies teacher handles the student portion during her regularly scheduled class time. The TAG (talented and gifted) teacher prepares the items for uploading during her regular duty day, sometimes having to put in a few hours after school to prepare the items. I, as the computer teacher, do the uploading, downloading, editing and printing for the classroom teacher before I start my regular duty day and after school. This is my second simulation and I know I have gotten faster at it but it still can take up to two extra hours outside of my regular day. I come it a 6 am to take care of my portion of the simulation to have it ready for the teacher. Then I start my regular day at 8:00.

Even with schedules and time commitments as indicated, teachers keep repeating the exercise. They see how excited the students become, and they see some of the changes in the students that we have described. While this teacher's example indicates that the group of teachers at her are still trying to control most aspects of the process, veteran teachers generally learn to involve the students in more and more of the processes. One of the key limitations is access to the computer and telephone. Most schools are able to gradually move towards having access directly in the classroom, allowing many of the difficulties described above to fall to the students.

In addition to becoming more of a partner in learning with the students, the teachers also develop a greater feeling of self esteem and confidence in their professional abilities as a teacher. As teachers from a variety of sized systems, from large urban districts to small rural schools, they constantly struggle with how to teach the prescribed curriculum. One facilitator describes the ICS programs as "refreshing" in that they respect her as a professional teacher and allow her the latitude to work with her students and emphasize the skills as determined by *their* needs and abilities. Each class has different students and consequently different strengths and weaknesses in their abilities. "It's reassuring to be part of a program that doesn't assume where my students are or where they should be. It gives me the background material I need and then I involve my students at the highest level of their ability."

One area of developing professionalism was totally unexpected by the ICS staff. Many of these teachers are from schools with two or three teachers in their specific discipline. Even at the larger schools where there are up to ten teachers in the same department, each one lives in their own little world, with little time to discuss teaching techniques with others, if there are even others in the same area at the school. With the ICS activities, however, they are working with dozens of other teachers who have similar backgrounds and are teaching at least one course that has an almost identical subject matter. Instead of being one of a few teachers isolated at their school, they now are part of a network of fifty or sixty with common goals, common interests and daily interaction. At their request, a "facilitator's" conference has been set up where they can discuss teams and ask each other for help or reassurance. Through the use of the computer and the conferencing system, teachers all over the state, country and the world can (and do) communicate to offer suggestions, exchange ideas and just provide emotional support.

Additional Areas of Concern

In the short amount of time that was spent in examining the effects of these activities on the different participants, a few other areas emerged over and above the effects on the students and teachers. While we did not have the time or resources to fully investigate them, we can at least indicate areas worthy of future investigation.

One question that arises is: what happens to the status of the teacher within the school? These teachers become to be considered computer experts to a certain degree, and often assist their colleagues - at least in the use of the word processors. There is something deeper, however that occurs. Teachers seldom have difficulty raising the participation fee after the first time they've been involved - administrators see the involvement and excitement of the students and quickly support the exercises. There also seems to be a change in status due to being associated with a University project. The potential for jealousy is there, but it did not appear to be present when visiting the schools.

There are some changes to the institution that also were not examined. Where do the activities fit within the curriculum? A lot of schools run the activities as extra curricular for the first time around, but soon they become regular courses offered every year. How this type of curricular innovation becomes institutionalized should be considered. One difference between this activity and other curricular innovations is that ICS has survived at many schools after the original facilitator has left - not a common fate for new ideas that require so much effort.

One final focus should be to examine the impact that these activities have on the University environment. Professors from several schools have been involved in the design of the activities and have indirectly donated many hours to high school students - not a common habit of University professors. There is also a large population of students, graduate and undergraduate, who are working daily with students in the public and private schools as "controllers". These University students are from schools outside the field of education, generally from Political Science, Business, History or Natural Resources.[8] These students would normally have little to do with education, yet they are intimately involved with hundreds of secondary students on a daily basis. This must have some impact on their attitudes, at least towards the value of education, but this has not yet been explored.

Conclusions

We began this discussion by alluding to the difficulties that educators have had in finding appropriate uses for computer technology within the schools, and suggesting that the current trend of articles and papers touting telecommunications is headed toward a similar frustration. Our investigation into the ICS activities indicates that this is one type of activity that *does* provide valuable outcomes for all involved. The effects described for students are among the more nebulous goals that are often contained in School District statements of philosophy, yet somehow these goals don't fit into traditional courses and are often addressed only through extracurricular activities. The effects on the teachers in the form of building their professional abilities seem to be along the lines that administrators would welcome, too.

While there is still much to learn about these activities, It is clear that the appropriate use of the technology, as currently available, offers quite a bit to schools, and is worth the effort and expense.

---

[8] Six of the controllers, or university students, participated in ICS simulations while they were in high school. They all attributed their decision to attend Michigan based on the experience they had ICS while in high school.

THE INTERNATIONAL GROUP WORK: HOW A COMPUTER CONFERENCE CAN INVIGORATE TEACHING AND WRITING.

William W. Wright, Middelbury College, U.S.A.

People on the network that we started in 1984 are mostly secondary-school teachers who, in the summers, attend the Bread Loaf School of English, a graduate program in literature, writing, and theatre run by Middlebury College. Teachers, who attend the seven-week summer session in Vermont, go back to their homes and schools across the country -- some in places as remote as McGrath, Alaska, and Wilsall, Montana. They use the network (called BreadNet) to communicate by dialing into a central or host computer and using a computer conference system called Participate.

We use the term "telecomputing" (which is used in England and more frequently in the U.S.) to separate what we are doing from other forms of telecommunications such as satellite, audio conferencing, FAX, or video teleconferencing. We also want to point out that when we describe a computer conference, we mean an asynchronous (not real-time) conference. A computer conference allows the user to send notes to a topic (for example, "book talk"). Other users dial in at their convenience, download other notes under that topic, read, and add a note. To reduce costs, we encourage what we call "guerrilla telecomputing." Users dial into the host computer, download (receive) notes to a disk, log off, and read (print or read on the screen) the notes. They then respond -- using their own word processing package -- in a thoughtful manner and without having to worry about connect-time costs. When they finish the note they can then dial in and upload (send) their writing and any student writing that has been collected on disk.

Careful planning is the key

We know that, when proper training and support are offered, an electronic network can be a tremendous support and professional development tool for isolated teachers (and what teacher does not feel cut off?). We also know that an electronic network should NOT be used as an expensive way to send penpal letters. If one-to-one exchanges between classrooms are set up, then the teacher should set specific dates for uploading (usually two weeks between batches) and have students do several kinds of writing -- not just letters. Matching students one-to-one with students in partner schools can be a problem also. It is better to send selective pieces or pieces done as a collaborative effort -- not a piece of writing from each student--to the partner school.

Several classrooms working together

We have found that groups of classrooms can work on a computer conference in creative ways that let several classrooms--not just one partner school--share the writing of a class. For example, rather than have just one classroom in New York be part of our rich, compelling writing exchange with a school in Lima, Peru, we set up a computer conference called "world trade" which allowed a group of classrooms to benefit. We also found a way to cut down on costs of exchanges with overseas schools which all have to pay telecomputing surcharges. Rather than have thirty redundant pieces of writing come across the wires from Peru, we encouraged collaborative work. Five team-written essays were uploaded.

In our interactive writing conferences, classrooms signed up for a week-long slot. Teams of students sent descriptive essays--work that they knew ten other classrooms (not just one partner) would see. Students reading the pieces at the cooperating schools put up constructive comments about parts that were not clear. Models of good writing and models of revision were there for lots of students to see.

This collaborative writing not only saved telecomputing costs, but allowed for the kind of writing that people will have to do in the workplace. Researchers (Howard, 1988) say that seventy-five percent of what's written in the workplace today is done collaboratively. Students also need to learn more about communications technologies. According to Professor Ann Hill Duin, research indicates that large companies need more communication and telecommunication knowledge than they have received in past years. In the workplace a substantial amount of communication is now conducted via computer. Within five years, three-fourths of a person's communication in the workplace could be transmitted by electronic mail and other avenues of telecommunications.

We had other collaborative writing workshops--a structure which, when a good moderator is in charge, seems to produce the most benefit for the cost when you use telecomputing to help with the teaching of writing. One such venture, called "workshop" produced some rich writing and excellent comments from students across the country who were reading the writing. Here is the opening note on the "workshop" conference:

"WORKSHOP" by WWRIGHT, Feb. 9, 1988 at 19:26 about RESPONDING TO STUDENT WRITING (975 characters & 218 notes)

The purpose of this workshop is to provide a forum for student writers interested in peer responses. It is open to all ages and all types of writing. Each Sunday a different school will be offering their work for your reactions. Comments will be accepted through that week.

Would each contributor please give his/her name, age, and school? You may wish to note if the work is still in progress. Feel free to offer any questions or concerns that you might like to see the group address.

Would each person writing comments also note his/her name and school, as well as the name of the piece you're responding to? Please balance criticism with positive suggestions and try to be specific in explaining your reactions.

--Bill Durbin (wdurbin)

Note: Bill Durbin (wdurbin) will moderate this conference. Bill will put up the first writing on Sunday, February 14. Let him know if you would like to contribute writing at a later date.

--WWW

A good moderator is essential. Bill Durbin from Minnesota kept "workshop" running smoothly. He set up the guidelines, got schools to sign up for slots, and made sure schools put writing up on schedule. The following is the opener (the first note of a conference) which shows guidelines for an international writing project called "world trade." Den Latham in South Carolina kept "world trade" moving.

"WORLD TRADE" by WWRIGHT, Dec. 1, 1988 at 18:55 about DESCRIPTIVE ESSAYS FROM AROUND THE WORLD (1260 characters & 61 notes)

In this conference, classes from around the world will put up observations or descriptive essays. Others (students or teachers) can respond. New essays go up every two weeks (on Fridays or weekends).

Guidelines:

-Check with Den Latham (dlatham) if you want to sign up for a slot.

- Writing should be a descriptive essay or observation (nonfiction).
- Classes (students and teachers) respond if they wish. (We encourage each school signing up to put up at least one response or question.)
- Writing going up in each slot should not be more than two to four double-spaced pages. (We encourage collaborative writing.)
- Starting with Lima on 12/1, we hope to have essays from an international school each month. (We hope to have writing from London, Israel, Canada, and Japan later in the spring.)
- When you upload essays, be sure to start with
  - student's name
  - school
  - location

People on BreadNet should not feel obligated to stay on this conference. You can, at the ACTION==> prompt, type leave "world trade" to take a break from overloaded buffers or join "world trade" to get back on and see what is happening. We think that it will be exciting.

--WWW

Using other databases to tie in with the topic being discussed

Here is an example from the "world trade" conference. Students in Peru put up a letter from saying that the North American press had been exaggerating the events in that country. We did a keyword search on the AP newswire using one of the relatively inexpensive commercial database services (The Source) and uploaded a story for others to see.

---

2 (of 45) DLATHAM Dec. 3, 1988 at 11:25 Eastern (12225 characters)

Peru is a third world country that is trying to keep up with the times. The papers make it sound a lot worse off than it is, not that it doesn't have it's problems. It's extremely unstable politically. The government is supposedly Democratic, but in reality it's more Authoritarian and the President, Garcia, can basically do whatever he wants. Last year he nationalized the Banks and refusing to repay the owners, and letting go a number of employees.

The predominate Terrorist group, The" Syndero Luminoso" (The Shining Path)

[I left off the rest of this note. You get the gist. WWW.]

3 (of 45) WWRIGHT Dec. 3, 1988 at 17:06 Eastern (2810 characters)

Dear Nicole, Stephanie, Kevin, Javier, Maureen, and Larry--

This is Bill Wright in Washington, DC.

I enjoyed reading your descriptions of Lima. I realize that you wrote these some time ago. Is the press still exaggerating things? I pulled this story off of the Associated Press (AP) newswire (another way to use telecomputing in the classroom) and wonder if it is accurate:

***

1 01 Dec 88 21:22 Thursday
Peru, Peru Police Arrest Strikers

LIMA, Peru (AP) _ Police fired tear gas, arrested scores of protesters and ripped down barricades of burning tires Thursday during an illegal general strike against government austerity measures, officials said.

Police said 78 people were arrested as they tried to march into downtown Lima, but strike leader Valentin Pacho claimed police had arrested more than 500. Authorities said leftist guerrillas seized and burned a city bus.

No injuries were reported.

It was the fourth general work stoppage this year and fifth against the 3-year-old government of President Alan Garcia. The strike comes during growing unrest caused by Peru's most serious economic recession this century.

Some one-to-one exchanges--especially with younger students--have worked well. Teacher Tracy Winn in Watertown, Massachusetts, and John Forsyth, Montana attorney-turned-teacher, planned exchanges well (you will upload this on this date), built in a variety of types of writing, and stuck to the plan. E-mail, they thought, provided an immediacy that was important if you want to fit an exchange into a grading period. They also thought that e-mail was an important tool for planning, evaluating, and making mid-course corrections.

The computer conference, as we said, is most useful as a place for teachers to share ideas. Sometimes the ideas put up by teachers came from students. One note on the conference is a how-to-interview piece put together by students in Gilbert, South Carolina. Teachers from across the country and overseas use that. A teacher in upstate New York put up a note about how to get administration to pay more attention to the English teacher. That drew almost as many responses as a note from Iowa about how to teach grammar. When a teacher sees a good article in the ENGLISH JOURNAL or HARVARD EDUCATIONAL REVIEW or the NEW

YORK TIMES, a summary and reference goes up for sixty colleagues to see. There is much value in having these people share ideas from their rural living rooms.

Online guests and interactive journalism

On several occasions we set up a way for a busy professional to visit teachers and classrooms. In 1988, during the U.S. presidential campaign, we had as a guest the chief of staff for one of the presidential candidates. He answered questions from rural students and told how writing was used in the campaign. The structure was simple. We set up an appointment, called for questions on the network, then went to the Senate Office building armed with questions and a tape recorder. That night we uploaded appropriate answers and comments which included direct answers to questions sent by students in rural North Carolina and Montana. (The very generous chief of staff for Senator Gore was excited about the technology and suggested that we might want to start an interactive column for students--with Senate offices contributing.)

In the fall we had researcher Dr. Margaret Riel from San Diego come online (she had a computer and modem at home) and discuss ideas with teachers. This, as with "workshop" and "world trade," involved some structure. We announced that she would be available one Friday through Monday, collected questions the week before, and let the interaction begin. When the lively discussion on telecomputing was over, the transcript was forty pages long and involved ideas from teachers all over the world. A couple of telecomputing veterans said that it included some of the best information on this subject they have seen anywhere.

Another experiment that we tried with this medium was to have interactive journalism from the National Council of Teachers of English (NCTE) meeting in St. Louis. Reporters went out to sessions and put a summary up on the computer conference. Rural teachers who could not attend put up questions or comments. Many out in their rural living rooms got a better sense of what went on at the meeting than those who flew out there.

Putting all the ideas together into a "world class" event

On May 1, we started a computer conference called "world class." The goal was to have many classrooms across the country and overseas read and comment on an article in the December 1988 NATIONAL GEOGRAPHIC--an article about the destruction of rain forests in Brazil. The results were astounding. This demonstration of the potential of a computer conference included:

- an international online reading/discussion group
- online guests (experts from two environmental groups)
- questions from one class that were answered by another
- a sharing of resources
- an essay exchange arranged in South America

-grading of South American essays by a class in eastern Kentucky
-a Middlebury professor as "visiting lecturer" who suggested a syllabus
-posting of information sheets just being developed by professionals at the Nature Conservancy

As students from the coal-mining region in Eastern Kentucky compared their plight to the slash-and-burn farmers in the tropics, no small amount of critical thinking took place. Biology teachers from North Carolina came in and responded to eleventh-graders in Virginia about biodiversity. A Washington professional put up ideas about debt-for-nature swaps. Students in New York put up more places to write than any one environmental group could possibly come up with. A librarian did an online search and listed twenty or so excellent magazine articles. An English professor put up a syllabus for English teachers to use in an elective next year. People of all ages, in many countries, were using writing to try to deal with a problem that affects us all. Computer science teachers in Lima and Santiago worked with English teachers. Fifteen essays from Chile--part of the international essay exchange that we hope will continue next year--summarized the ideas. The transcript of "world class" is there--richer than any textbook--for people to dial into and use. We see the event as a prototype of a bigger collaborative project for 1989-90.

We have just scratched the surface with ways that you can use a network with the teaching of English and writing. A promising project this year had a Georgetown University teacher of Native American literature on a conference with several reservations. College students were swapping ideas with high school students in a very different culture. A college professor was getting ideas from high school teachers. Some teachers have suggested that it could be a place for sharing curriculum ideas. A teacher in Connecticut could put up his syllabus for an elective called "Trout fishing and literature" and someone in London could put her reading list for contemporary fiction. A database of good curriculm ideas and lesson plans could be developed. Of course there are many other ideas.

Here are some of the benefits of a using a computer conference:

-designed for group work (an improvement on E-mail)
-convenience of asynchronous communication
-you have a transcript of the discussion
-ideas generated (total is greater than the sum of the parts)
-isolated teachers share ideas
-students write for new audiences
-bring busy professionals to the classroom
-cross-cultural connections help students learn more than they do from textbooks and news stories
-students and teachers learn to use information technologies

And here are some of the tips for making a computer conference work:

- -proper training
    - -we have hands-on sessions in the summer
- -technical support for each user
    - -Get English and computer teachers to work together when teacher gets back to school
- -strong moderator for conferences
    - -set structure
    - -thread notes
    - -make phone calls to nudge people
    - -monthly paper newsletter
- -set guidelines and structure
    - -have users agree to read/write at least once a week
    - -have a task to accomplish and set deadlines
- -follow up on a face-to-face meeting
    - -for example Bread Loaf teachers follow up on a summer graduate session
- -push for collaborative writing

Note: If your project has several sites in one country, you can reduce costs by setting up what is called a parallel conference. For example, rather than have eight people in Tokyo pay PTT costs to send notes to a host in the U.S., you can get a service such as DASnet to automatically port conference notes at a high speed. A single note on the conference crosses the Pacific ONCE -- not eight times.

NEA President Mary Futrell said the following (NEA Today, December 1988) about PSInet, a network being supported by IBM and the NEA Mastery in Learning Project: "For those of us who have worked in schools that keep teachers distant from one another and condemn us to the chill of isolation, the idea that a teacher in Arizona can seek counsel of a teacher in Florida is nothing short or exhilarating." We agree with Ms. Futrell and think that telecomputing, when used properly, can invigorate teaching -- as well as the thinking and writing of students.

Howard, Fran. "Collaborative Writing and Telecommunications," Minnesota Computing, Vol,3, No.1, Fall 1988.

CHAPTER II

IMPLEMENTATION & INSTRUCTIONAL STRATEGIES

NETWORKS & TECHNOLOGY IN ENVIRONMENTAL EDUCATION: A STRATEGY FOR INTRODUCTION TECHNOLOGY IN ORDINARY CLASSROOM PRACTICE

Ove Biilman, Royal Danish School of Educational Studies, DENMARK

The paper presents aspects of the rationale, organization and practice of an attempt to study and further use of computers and network communication in the teaching of the school subjects - i. e. as applicable and competitive tools and procedures among the school subjects traditional media and methods. It has been a basic and to a certain degree confirmed assumption, that information technology should be most efficient and convincing introduced into primary and secondary education as a device and multiplier for normal education and teaching of the school subjects. In consequence the paper emphasize analysis, study and development of educational content, organization and practice rather than technology as such.

1. The context and the project.

The CERIT project accommodates a European and national co-operation on educational development and research in informatics in the school subjects. It is initiated by the Royal Danish School of Educational Studies. The departments of Biology, Physics, Geography and Foreign Languages are responsible for educational development in the field of local and environmental studies. Activities in Denmark are based on co-operation with lower secondary schools and teachers centres in Odense, Ålborg, Århus and the Greater Copenhagen area, teacher training colleges and IBM Denmark. Teacher training activities are carried out in co-operation with the Project to Link Universities and Training Organizations (PLUTO). The IGU (International Geographical Union) Commission on Education intend to further development of continuing education of geography teachers with emphasis on distant education in 1989-1992. Thus the Danish and European work in this field will be conducted in a global framework.

Local environmental studies connected with other school classes' parallel environmental studies and studies of foreign regions express and highlight the local-foreign dialectic - a basic perspective of geography and international studies. The pupils' individual environmental literacy are developed and integrated in their world image and literacy as a mature or later stage of environmental literacy.

These relations are crucial to curricular considerations, lessons planning and teaching practice in various sorts of local, regional or international studies irrespective of their integrated or geographical content organization. In fact it represents a dimension inherent in all environmental and international education - analytically as well as practically.

The suggested educational modules can easily be applied to different national or curricular settings. This means, that the topics can be taught under different headings and circumstances. This is prerequsite to an international co-operation on average classroom and field work level. The modules may be models of learning and training applicable to innovative efforts in other circumstances and on other levels, topics or subjects. E. g. development of teacher further education and distant education modules on the same topics as well as on global resources are in progress.

The educational development mediate important content areas, skills and attitudes organized and implemented according to sound educational and scientific principles. The use of networking and various technological tools is legitimated and planned through a preceding didactical analysis. That is why this use of electronic mail seems to be more genuine educational useful than a mere electronic pen-palling.

2. Educational content.

The word content is stressed while introduction of informatics and educational technology in normal subject education is one of the basic ideas of the CERIT project. Following a short description of some educational topics which reflects basic aims and aspects of the intended educational practice. The starting point is the local environment with emphasis on observations of local meteorology (incl. a basic climatic outlook), air pollution and environmental changes, risks and damages. Weather and some environmental observations for obvious reasons are carried out synchronous.

Pupils observe, describe and assess natural and human environments emphasizing meteorology and air pollution in local as well as larger scales. Observations and assessments are carried out in several periods a year. Observations and assessments are analyzed and compared with relevant sources -weather reports, satellite photos, supplementing milieu observations etc.

Introductory observations of weather and air pollution motivate and legitimate field studies and further science studies aiming at changing environments in local, regional and global scales. This work includes:

- observation, analysis and assessment of a variety of milieu factors in different environments,
- comprehensive documentation on milieu damages, struggle against air, water etc. pollution and restoring of ruined environments,
- observation and documentation of phenomena important to living conditions, social welfare and life style - e. g. demographic, ethnic, social and economic composition of populations, neighbourhoods and regions (Hübbe 1988),
- co-operative description, comparison and evaluation of different environments and living conditions (Annex 1 and Biilmann 1988 pp. 130-133).

The later educational topics or modules highlight themes as national and global population with emphasis on demographic, economic and social studies and local living conditions studied in various perspectives.

In general the topics or approaches mentioned hold empiric exercises as learning experiences. Population and living condition hold typical hermeneutic exercises. Especially pupils evaluation of local (and remote) environments hold activities comparable to participant and qualitative research.

In conclusion these educational developmental works and studies highlight:

- Foreign language education as cultural mediation.
- Weather observation.
- Changing weather and pollution analyzed at different places.
- Environmental damages and local living conditions.
- Pupils evaluation of local environment.

The cultural mediation is inherent in all the activities. It is also a basic feature of a "get acquainted activity" where a school class presents itself, its school and the local context to a co-operating school class through (preferably) electronic mail, slides, a video or in an unformal way. The "get acquainted activity" may start the co-operation or it may turn out as one of the results of the more comprehensive mutual work on local environments and societies.

3. Technological base and developments

The project aims at teaching practices emphasizing a wide range of exercises, observations and field studies. Pupils' experiences and observations are analyzed and stored in computers as a part of this educational activity. A datalogical network facilitates data presentation, data exchanges and comparisons between school classes doing local studies in different areas or countries (Larsen pp. 141). The class to class co-operation is primarily based on electronic mail.

In the first two years the communication was organized by a network centre at the Royal Danish School of Educational Studies (DLH EARN) and facilitated by the European Academic and Research Network (EARN) and the Danish University Computer Centre at Lyngby (UNI-C).

The aim is to establish a permanent Danish organization for educational networking including distant education facilities at the Royal Danish School of Educational Studies. This centre should facilitate communication, database etc. services usable for all kinds of educational purposes.

The work in the CERIT project has provoked different attached initiatives and developments of which two will be touched upon here.

Pupils studies of weather and environment combined with their access to computers and network communication made continuous, comparable and automatic measurements topical. That led to the start of the development of a computer operated measurement station (Annex 2 and Larsen 1988 pp. 137-140).

Field studies and classroom use of meteorological data and maps initiated use of satellite photos (paper) and an educational development attempting to give children access to read, interpret and manipulate of satellite images on computers (Annex 3).

4. Ideas, constraints and experiences

The project work attempts to investigate teaching planning and practice as well as pupil's learning thoroughly through didactic analysis, evaluative studies, classroom observations and empirical studies.

Design and conduction of these educational studies thus depends on the course of events of educational developmental works. Research design and even many basic educational decisions in this field have to await a sequence of events on various levels. It also depends on availability or implementation of relevant technology and software. Therefore it is important that the educational and scientific aims of the work are still kept in mind - especially when practical, organizational or technological constraints seem to absorb attention and resources.

Eventually valuable ideas or innovations might be produced in this "educational laboratory". That applies to educational use of different types of courseware, general computer programmes, network communication and distant learning systems and different technological tools - i. e. on how and under which circumstances, they may be profitably used and when not. Specific demands which must be met by future curriculum design, teaching aids, distant learning systems or learner's stations may be identified.

The CERIT activities have covered educational implementation of a broad range of software, equipment and procedures. The confirmed findings have been few and not very surprising. Experiences - some of them very preliminary - referred by teachers, pupils and the project staff nevertheless reflect trends which could be worth to report.

Communication by network has been widely appreciated as a motivating, valuable and efficient tool in co-operation among Danish school classes and schools. It goes for all the topics and for many of the educational activities mentioned.

The communication by network between the English and Danish school classes has suffered from many difficulties mainly caused by shortage of IBM-compatible equipment, technological problems and other unfavourable conditions in the English setting. Nevertheless there are encouraging examples of motivating and lively co-operation between English and Danish school classes. In these cases network communication has played an important part in the work. In other cases, the communication has been restricted to normal mailing. An uncomplicated and safe network communication generally is an imperative.

Despite some rather disappointing international experiences, we have started an until now promising similar co-operation between West German and Danish school classes. We also intend to continue the English -Danish co-operation and to get co-operative educational development with other countries of the ground. We are convinced, that these activities will pay off when they are assessed in educational terms or as attempts to further international understanding.

The teachers' accept of networking as a tool for normal classroom practice is prerequisite to a serious educational use of telecommunication in international class to class co-operation.

Use of telecommunication should be mentioned in national or local curricula for different subjects as valuable or necessary - if it is so. This could contribute to ensure a place for the communication and the use of computer technology among the other tools or media applicable to different school subjects or topics.

5. General educational comments and conclusions.

Observations and experiences in the local environment per se are frames of reference and often motivating starting points for studies of foreign places, regions and people. The dialectic interaction between the near and well known and the remote and unknown is a basic geographical perspective. It is also prerequisite to the development of international understanding as well as to the development of environmental and world literacy and images.

The claim that environmental literacy is important if not basic to normal personality development as well as to international understanding is supported by good educational grounds (e. g. Hard et. al. 1984) and some evidence (Biilmann 1980, 1986 pp. 29-30, Kaplan & Kaplan 1982). This legitimate and partly explain why local and environmental studies for a long time has played an important part of the teaching practice of geography and other school subjects. No wonder that environmental studies have been thoroughly educationally considered and reinvented.

The remarks on images or schemata and on environmental as well as world literacy and studies illustrate how methodological developments as the introduction of informational technology into a school subject contribute to both development and rethinking of basic educational (didactical) ideas. In continuation hereof it should be stressed that a comprehensive and easy manageable geographical information system may posses great values and an important educational potential which would support and develop international and geographical education as well as geographical didactics (Peuquet 1988).

These general statements stress the educational and moral qualities of local and international studies. The preliminary findings and experiences of the CERIT project supports the even more general conclusion, that international co-operation between school classes on structured work in these areas is among the better ways of utilizing telecommunication and other technologies in normal classroom practice. A teaching practice along these lines may contribute to both empathy and realism.

References and a few publications on geographical and environmental education (which may not be familiar to the symposium participants):

Biilmann O. (1980). Regionale Geographie - Eine fachdidaktische Skizze. In Brinkmann W. & Reinhardt K. H. eds. Praxis und Theorie der Geographiedidaktik in Danemark, Deutschland und Schottland. Hamburg: Fachbereich Erziehungswissenschaft der Universitat Hamburg. pp. 42-61.

Biilmann O. (1986). Danish Pupil's Knowledge of the Geography of European Countries. Internationaler Schulbuchforschung 8.2 pp. 195-213.

Biilmann O. (1987). Environmental Education, Textbooks and Educational Technology. Internationaler Schulbuchforschung 9.2. pp. 181-191.

Biilmann O. (1988). The development of environmental literacy through geography. In Gerber R. & Lidstone J. (eds.) Developing skills in geographical Education. International Geographical Union Commission on Geographical Education. Brisbane: The Jacaranda Press.

Gregory D. (1985). People, places and practices: the future of human geography. In King R. (ed). Geographical Futures. Sheffield: The Geographical Association. pp. 56-76.

Hard G., Jessen F. & Schirge M. (1984). Umweltwahrnehmung in der Stadt. Kock H. ed. Studien zum Erkenntnisprozess im Geographieunterricht. Koln: Aulis Verlag. pp. 113-165.

Hübbe T. (1988). Local studies and the use of general applicational in ordinary classroom geography. Gerber R. and Lidstone J. (eds). Developing skills in geographical education. International Geographical Union Commission on Geographical Education. Brisbane: Jacaranda Press.pp.142-146.

Kaplan S. & Kaplan R. (1982). Cognition and Environment. N.Y.: Praeger.

Kates R. W. (1987). The Human Environment: The Road Not Taken, The Road Still Beckoning. Ann. Ass.Amer.Geogr. 77(7) pp.525-534.

Larsen K.J. (1988). The use of computers in local environmental studies in the lower secondary school. Gerber R. and Lidstone J. (eds). Developing skills in geographical education. International Geographical Union Commission on Geographical Education. Brisbane: Jacaranda Press. pp.135-141.

Lloyd R. (1982). A Look at Images. Ann. Ass. Amer. Geogr. 72 (4) pp. 532-548.

Lynch K. (1960). The Image of the City. Cambridge, Mass.: M.I.T. Press.

Peuquet D. J. (1988). Representation of Geographic Space: Toward a Conceptual Synthesis. Ann. Amer. Geogr. 18(3) pp. 375-394.

Stea D. & Blaut J. M. (1972). Towards a Developmental Theory of Spatial Learning. Downs R. M. & Stea D. eds. Image and Environment. Chicago: Aldine. pp. 51-62.

Tuan Yi-Fu. (1971). Geography, phenomenology and the study of Humam nature. Canadian Geographer XV.3 pp. 181-192.

Williams M., Biilmann O., Hahn R. Van Wesrhenen J. (1984). A Cross-national Study of Children's Attitudes. In Haubrich H. ed. Perception of People and Places. Paper Collection of the Symposium of the Commision "Geographical Education" 25th Int. Geogr. Congress Freiburg. pp. 137-63.

Annex 1.
Local built up area studies perspectivated.

The activities in local built up areas reflect a traditional Kevin Lynch approach, some well known behavioural geographical approaches e. g. on attitudes and a try to catch wider regional perspectives. They attempt a manageable fulfilment of at least three functions i. e. as:

- motivating local environmental learning activities based on and mediating a scientifically sound content
- learning experiences at the same time emphasizing different regional scales and the near/known - distant/unknown dialectic. This is in the CERIT-context also considered and studied as a dialectic between pupils direct experience of the environment and the indirect experience of foreign regions (and sometimes also the local environment) through representations or media,
- a device for studies of pupils attitudes and knowledge.

These partly questionnaire based exercises have already been extensively used and their first and third function are tentatively considered as confirmed. In consequence they are easily applicable on most societies. It means, that exercises of that kind may catch and further important aspects of pupils environmental literacy and support teachers' successive diagnostic evaluative efforts.

Annex 2.
A computer operated measurement station.
By Keld Juhl Larsen.

A prototype of a computer operated weather station has been developed at the Royal Danish School of Educational Studies. Eight copies of this first version will be mounted, tested and used at DLH in the major Danish cities and one or two places abroad in the winter 1988-89. This extension of the CERIT project is supported by Lærerstandens Brandforsikring, IBM Denmark and other Danish companies.

The software operating the station enable pupils to set up measurement series for eight parameters - temperatures in three different levels, precipitation, wind direction, wind velocity, air moisture, and air pressure. Measurements can be carried out in periods ranging from one to twenty-four hours. Measurements of the chosen parameters are automatically carried out each 6th minute. Measurement tables and diagrams are shown on the screen and data can be saved on the disk. Measurements of other environmental parameters will be added later.

The following development aims at:

- turning the prototype into an operational weather station,
- the extension of the measurement station into an all round, flexible milieu measurement station,
- the construction of a multipurpose measurement unit based on the prototype and suitable for physical, biological etc. measurements.

Annex 3.
Satellite photos.
By Keld Juhl Larsen.

The use of satellite images especially METEOSAT detections introduces the study of weather phenomena in a larger scale in the classroom enabling the pupils to consider observations made in their local environment in a larger, perhaps global scale.

Satellite images stored in a digital form provide a variety of informations - e. g. cloud cover and to a certain degree cloud type and areas with different temperatures on sea and land.

Digital satellite images are traditionally processed and presented on professional and expensive digital image processing equipment. This developmental work at the Geographical Department at the Royal Danish School of Educational Studies intends to enable secondary school pupils to perform simple digital processing on METEOSAT and NOAH detections by use of standard school computer equipment. These efforts have been supported by the Geographical Department of the University of Copenhagen.

The digital images delivered from The Danish Meteorological Institute on tape, has been modified to a format (matrices of 512 x 512 of byte) which enables us to store one image on a 360 kb 5 1/4 inch disk. It is possible to present and process the images on personal computers with an internal storage capacity of only 256 kb, a standard colour Graphics Adapter and a colour screen in 320 x 200 mode.

If the computer has 512 kb of internal storage it is possible to create a virtual disk drive large enough to store one image of 512x512 byte. This facility speeds up image processing a lot. Each of the pixels in the image (which has 262.144 pixels) is defined by 8 bit which equals one byte and has a value between 0 and 255. The professional equipment present each of these values as a colour on the screen and thereby a lot of information. The participants of the CERIT project have access to IBM pc's which only are capable to show four colours on the monitor. In spite of this limitation it is possible to present a picture in pseudo colours on the screen (by choosing significant pixel intervals from the image), where land masses, the sea and cloud formations can be clearly seen and analyzed.

The processed pictures can be saved on disk as a 26 kb picture file which enables us to show series of pictures on the screen. The pictures can easily and quickly be communicated via the IBM-DLH network. Descriptions of a METEOSAT picture can be made on a special designed screen. The teacher can use the same facility for exercises or comments on the images.

The programme facilitates presentation and simple digital image processing based on statistical calculations and presentations - a pixel histogram - made by the computer. The pupil can highlight areas with different cloud temperatures or sea level and land surface temperatures by choosing different pixel intervals. The program also facilitates presentation of parts of the image in high resolution.

The 26 kb satellite picture files can be loaded into a drawing application - e. g. PC-paint - and different information can be shown and drawn on the pictures. Is is also possible to load series of METEOSAT pictures in PC Story Board which facilitates animation and description of typical weather situations.

Status: By November 1988 prototype software for processing and presenting satellite images are preliminary tested.

The following development aims at:

- preparation and testing of software appropriate for educational useful receiving, storing, processing and presentation of various kinds of satellite images,
- implementation of the system in different learning environments,
- application of the system to the computer operated measurement station and to the DLHEARN distant education facility.

PROJECT SPECIAL LINK: A TELECOOPERATION BASED COMMUNITY LEARNING ENVIRONMENT FOSTERING ACADEMIC AND SOCIAL DEVELOPMENT, AMONG PEOPLE IN HOMES, SCHOOLS, LIBRARIES, HOSPITALS AND OTHER LEARNING ENVIRONMENTS

John Cameron, North York Board of Education, CANADA

As a result of advances in medicine, increased political awareness and legislation requiring equal opportunity for all students, students are now entering school systems with needs that many school systems, until recently, generally assumed they could not integrate into their programmes. The notion of who has the right to a full and well rounded education and the ability of technology to provide delivery mechanisms for educational programmes, has forced many educational policy makers and planners to reconsider their positions. This is particularly the case with those groups of students who who cannot attend school on a regular basis.

Consequently, school Boards are faced with the challenge of providing equal opportunity access to educational services for such children. This is particularly challenging since in many cases these students cannot attend school in a traditional manner and for medical reasons are confined to their hospitals or homes. However, the power and flexibility inherent in telecommunications software and hardware equipment can allow these and other students to overcome many of the physical limitations imposed upon them by distance and medical conditions.

During 1987 The North York Board of Education in Ontario, Canada, through Ron Mason the Coordinator of Special Education, anticipated this need and responded by proposing a pilot project entitled Project Special LINK designed to link home-bound students with a school in their community. The students are considered as members of specific classes within their schools. The telecommunications component of Project Special LINK allows scheduled interaction with teachers and classmates thus providing educational and social enrichment. An organisational framework for the policy, organisation and operation of the pilot project was subsequently defined. The first stages of project implementation began during January 1988. The diagram at the end of this paper illustrates the interrelationship of project components.

Project Hardware and Software Organisation

Users have two main telecommunication options. The first option involves a direct link from school to wherever the student is residing. For example, if the student is at home teachers and students can operate in the chat and mode and discuss the lesson content or issues that are currently taking place within the classroom. Chat mode allows real time discussion and interaction where questions can be asked and any content can be explained in detail as required. This mode can continue until the student at home has enough information to continue working on an independent basis. When this condition is met teachers and students in the classroom can then send files that can contain assignments or more information on the topic under discussion.

The student at home need only leave the computer they are using in an answer mode and the files from the school are automatically transferred. Files can be sent at anytime to the home computer as long as the student at home remembers to leave it in the answer mode. The communications software being used also allows whoever sent the data from the school to catalogue the home computers directory to ensure that no errors have taken place in the transmission.

The second telecommunications option involves sending data via a third computer located in the school systems main library. The project has four dedicated telephone lines that allow users flexible access to the system. This central node is a Unisys ICON central fileserver with a dedicated memory of 70 M.B. It is on twenty-four hours each day seven days a week. The Iconet software program available from Dr Manfred Hanke at Nipissing University North Bay Ontario, that runs this system has six powerful components. In order to use the system users are assigned passwords and E-Mail boxes. The entire Iconet program has these components:

Autoanswer: This program causes Iconet to switch communications parameters to match those of any incoming call from different types of computers and software.

Mail: Users on the system can send E-Mail messages to each other. Each time a person logs on the system checks for mail and automatically lists any that is waiting to be read. An interesting feature contained in the system is the a beep will go off if someone is trying to reach you if you are on the system talking to a second person, Iconet also informs each user when the mail they sent has been read.

Conference: Conferences can be open or closed, and may be held in real or delayed time.

Chat: This option allows for real time communication. It appears to foster small group interaction and expression. Many users who are otherwise intimidated with the telephone or face-to-face encounters enjoy the chat mode

Learn: This component allows subject specialists to develop interactive C.A.I programs that can be user for distance learning.

Utility: This option basic file manipulation where files can be sent to and received from other locations.

Pilot: Allows a wide range of users with no prior experience to develop interactive C.A.I. units.

Voice: E-Mail and other text can be heard through an audio output providing that the users computer has a speech chip. The Icon fileserver supports this application.

The next section will discuss how the project is administered and operates on a day to day basis.

Project Operation And Administrative Overview

Many large school boards have traditionally handled the needs of home-bound students at home or in hospital by sending an itinerant teacher five hours a week. Our goal here has been to go beyond this and redefine the relationship the home-bound student has with the school. In accepting a representation that defines the student as physically and psychologically removed from the school, we have rejected this in favour of a model that believes student-school separation as a result of distance is irrelevant Having done this we enhance the students self perception as a necessary daily participant within an identified grouping within a school. Where possible we have tried to provide leadership opportunities for those students working at a distance so that they gain extra status as a member of a school class.m It is also vital that the community be involved so that realistic educational approaches that would have transfer potential to future workplace settings. Further, a clearly defined need must be identified to justify the resource allocation necessary to staff and run projects like Special LINK. The evolution of this project for the first ten months of its operation was done on a volunteer basis. As a result of this it was determined that this form of telecommunication application was in fact cost-effective.

Other insights that were gained were that it is critical to have partners from other areas of education such as psychological services. This form of support we now believe to be critical since many of the families with seriously ill children are often in crisis. In fact it is not an exaggeration to say that despite our reliance on technology it is PEOPLE THAT MAKE THINGS HAPPEN through their creative application of technology. Corporate sponsors were also included from the start. Eventually the project's potential was recognised and since Jan 88 it has began to grow.

Project operation takes place within policy and procedure, curricular and staff development frameworks. Two committees act as policy and procedure formulating bodies with a highly diversified composition representing political, curricular, business, administrative, parental, teaching and medical interests. These committees have a very practical orientation. For example, one of the business representatives from the Unisys corporation helped facilitate the hardware acquisition process. The committees are also organised to provide support in other areas such as curricular and staff development. Operational management of the project is the responsibility of the project manager who serves on both the committees mentioned. Another important role within the project is that of case manager. Within each school a teacher has the role of a case manager for the student(s) at home or in hospital. The case manager organises a team working with the parents, students and the project manager to define a communications schedule and curricular objectives designed in accordance with students available time. A critical component in this phase of the project is direct parental co-operation and participation in the working team. Once an agreement to establish a link has been arrived at and curricular objectives defined, the project manager designs an individualised training programme to meet the often unique needs of each home/hospital school link. The training cycle, including hardware acquisition, on average, lasts between two and three weeks.

Project Operation And Administration Overview......continued

The progress of each location where the project is in operation is assessed on a regular basis to determine if the link established remains appropriate. It is projected that within the next five years that the number of potential candidates who will be able to make use of this type of educational service within the City of Toronto will be in excess of one hundred candidates.

An important aspect of Project Special LINK is the connection with Special Education. In Ontario ,Special Education is mandated by legislation with clear regulations regarding identification, placement , programming and review of student progress. By identifying student participating in Special LINK it provides safeguards for schools system and student alike. Review is ensured and objective decisions regarding the selection of students to be involved area made by an independent identification committee.

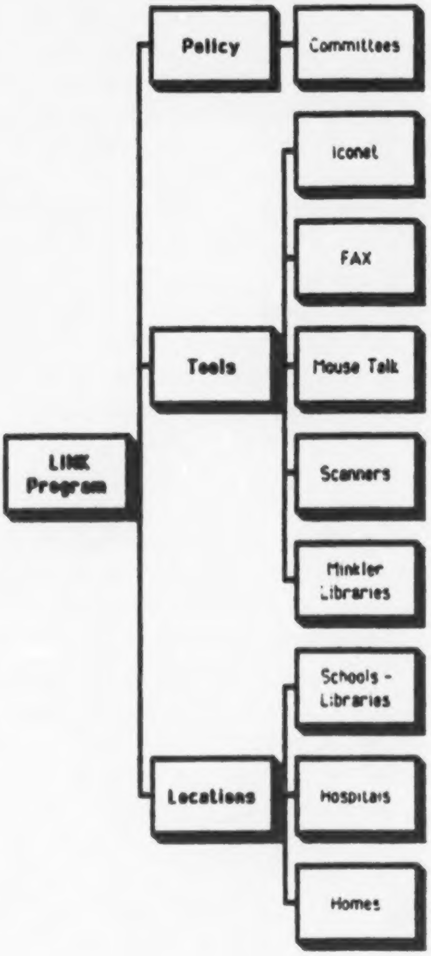
Some Tentative Observations And Conclusions

It is now clear that societies assuming the title of enlightened cannot ignore the needs each type of handicap presents existing within such societies. The educational needs of students that are isolated from their peers in hospital, home or other locations must be considered within the framework of educational policy. A step that would enhance the quality of programme delivery for home-bound students that might be considered is the establishment of a closer dialogue between hardware and assistive devices manufacturers.

Secondly it must be clearly understood that meeting the needs of the home-bound student in general requires that the total family situation be taken into account from the very onset of educational planning and intervention. Families of seriously ill children have been under high levels of stress for often a period of years. The anxiety, fear and ambiguity of such situation can often require medical, psychological and sociological professional support. Educators must be aware of these needs and consult very closely with the families they work with and with any other professionals that might also be working with these families.

PROJECT COMPONENTS

PROJECT LINK COMPONENTS


LINK Program
Policy
Committees
Tools
Iconet
FAX
Mouse Talk
Scanners
Minkler Libraries
Locations
Schools - Libraries
Hospitals
Homes

TELECOMMUNICATIONS & EQUITY: USING A TELECOMMUNICATIONS NETWORK TO ENHANCE AND MANAGE A STATE-WIDE EQUITY IN TECHNOLOGY PROJECT

Alice Fredman, The Educational Computer Consortium of Ohio, U.S.A.

INTRODUCTION: THE EQUITY IN TECHNOLOGY PROJECT

With the introduction of microcomputers into education, groups which had tended to suffer educational inequities now suffered from inequity in opportunities for computer literacy. Educational computer literacy threatened to separate groups and communities by giving some people more effective tools for living in the age of computer information systems.

In 1986, ECCO received a three-year grant from the Standard Oil Company (now BP America) to create a project which would promote equitable computer access in the state of Ohio by identifying areas of inequity in computer access for traditionally underserved populations -- females, minorities, economically disadvantaged and handicapped students -- and developing strategies to alleviate these inequities. A year of educational programs was held throughout the state, following which interested districts were invited to submit proposals for "Local Action Projects". Each project was to receive up to $3000, with $1000 available for the purchase of hardware. The remainder was to be spent for personnel and materials. Over 130 applications were received out of which twelve Local Action Projects were funded.

In 1988, a grant was received from the Ohio Department of Education using funds from the Education for Economic Security Act which enabled ECCO to fund twenty-three additional Local Action Projects, and in 1989 we received funds to add ten new projects.

In awarding the grants, ECCO endeavored to balance the projects in terms of inequity addressed, student population, location and type of district. Our forty-five sites are located throughout the state.

In an effort to encourage communication between the project sites and ECCO, among the Project leaders, and among the participating students, we furnished modems and software to all forty-five sites.

PROJECT MANAGEMENT

Each project leader was assigned to a mentor, most of whom live in the Cleveland area and had several projects for which they were responsible. The Equity in Technology coordinator worked with all the project leaders, corresponding with them frequently, and visiting each project at least once during the school year. The ECCO Director provided overall supervision to the Project. An Advisory Board set policy and met at least once each year.

INTRODUCTION OF TELECOMMUNICATIONS

It soon became clear, as the project grew with additional sites being added each year, that it was becoming increasingly difficult for either the mentors or the coordinator to stay in close contact with the project leaders. A method of maintaining this close contact was needed, and it was decided to introduce a telecommunications component into the project.

Modems and communication software were provided to each project site. The following modems and software were purchased:

DataLink modems by Applied Engineering (1200 baud) with *DataLinker* software for the Apple IIe and IIGS computers

Anchor 1200e modems for the Apple IIc computers -- we are ordering software from Apple for these modems.

Anchor MacPack modems (2400 baud) and *Quicklink* software for the Macintosh computers

Direct Connect modem and software from Radio Shack for the Tandy SL1000.

A telecommunications training packet (attached) was prepared for each project leader. The project coordinator and the ECCO director visited each site and assisted the project leader in connecting the modem and getting on-line. In many cases, new telephone wiring had to be installed or rolling carts had to be purchased in order for the project leader to take the computer to a telephone line. Funds had been budgeted in the grant to assist projects in paying for these costs as well as for telephone connect charges for schools outside of the Cleveland area. Project leaders were instructed to contact ECCO via their modems to insure that they understood how to use them.

For a communication network, we selected *Cleveland Free-Net*, a free, public access telecommunications network in Cleveland. *Free-Net* , a project of Case Western Reserve University, is directed by Thomas Grundner, PhD. This network was selected because of its commitment to free, open-access telecommunicating. Its concept is that of an "Electronic City". ECCO is involved in the creation and management of the Electronic Schoolhouse component of *Free-Net*, so our use of this network for our Equity project was a logical step.

The use of the modem as an information-sharing tool is only the first step for the project leaders. A second training packet will be prepared which will contain suggestions on how they can use their modems to incorporate telecommunications into their projects.

USES OF TELECOMMUNICATIONS IN THE EQUITY PROJECT

There are two separate and distinctive areas of telecommunications in the Equity in Technology Project. The first is as a management tool and is used to maintain contact between the projects and ECCO and among the project leaders. The second is the inclusion of telecommunications into the design of the Local Action Projects.

1. TELECOMMUNICATION AS A MANAGEMENT TOOL

With forty-five sites located throughout the state, this management function enables us to maintain close contact with the project leaders. Information exchanged includes such "housekeeping" functions as schedules, budgets, reporting, notices of meetings, etc. The coordinator can answer any questions relating to any aspect of the project, the mentors can offer advice and guidance to their project leaders, project leaders can share ideas, successes and frustrations with the coordinator and with each other.

Identification numbers were assigned to each project leaders. A directory will be given to each project leader which will contain a description of the project, the name, address and picture of each project leader and the Free-Net ID number.

The Equity in Technology Project will become part of the Electronic Schoolhouse and will contain a bulletin board, information desk, question and answer module and, currently in development, a chat mode.

2. TELECOMMUNICATIONS IN THE PROJECT DESIGNS

A number of the Local Action Projects included a telecommunications component in their project designs. A brief description of them follows:

"Communicating with Computers" -- Cincinnati City Schools. This project was designed to establish telecommunications among students in grades six to eight in 13 elementary and junior high schools. A series of activities was designed to familiarize students with the computer, booting up the communications software, and logging on and off. Improvement of writing skills was stressed throughout the project. One of the project goals was to improve understanding between students from various backgrounds. The computer opened new vistas; students communicated with students with whom they usually had no contact. Most of the telecommunication took place between affluent students and inner-city students. The process marked the first time that many of the students with these different backgrounds had any sort of contact with each other. A district-wide electronic bulletin board system is in the planning stages. The ability to transmit at any time, without waiting for the other party to be on line, will open the telecommunication process to many more students.

"Linking a Community of Special Learners" -- Madison Local Schools. This project focused on the developmentally learning handicapped, learning disabled and remedial reading students. It was designed to minimize "technological separatism" among these targeted groups. The use of telecommunications improved the social interaction between the high school lab and the orthopedic handicapped classroom in a nearby school district. These students gained solid experiences relative to computer education and benefitted from operating state of the art hardware and communication software programs.

"A Computerized Pragmatic Language Program" -- MacDonald Local Schools. The ability of a child to use the language system begins with the ability to affect a listener. So often students with language/learning disabilities are forced to contend with drill and practice computer programs that teach splinter skills and do not address their communicative needs. This project designed a pragmatic language program for speakers in one district to communicate with unfamiliar listeners in another district via the modem. A number of activities of increasing complexity were designed. 1) Communicating at the word level: Students developed crossword puzzles for the students in the other district. Ambiguous clues resulted in unsolved puzzles. 2) Communicating at the sentence level: Students created clues on a computerized game show. Correct answers indicated that the students in the other district had been provided with adequate information to answer the questions. 3) Communicating at the paragraph level: Directions were given to reproduce identical computer-created masks. 4) Complex directions: Directions were given for the creation of a computer dream house with hidden objects. 5) Student lessons: Students created their own activities using the skills they had developed throughout the project. This project helped students improve their communication skills and problem solving techniques, enrich their vocabularies, and improve their self-image.

"Companions Through Computers" -- South Euclid-Lyndhurst City Schools. **"Using the Computer to Introduce Disadvantaged Minority Female Teens to Professional Careers"** -- Hamilton City Schools. Both these projects addressed the need for elementary age girls to become comfortable with, and proficient in, the use of computers and to learn about women in non-traditional, technical fields. To achieve this, the girls communicated with female adult role models through a modem to learn about their careers.

"New Connections" -- Athens County Schools. Appalachian, economically disadvantaged students were the focus of this project which addressed the growing bifurcation between students who have opportunities to use computers and those who do not. Training in computer use and access to telecomputing services were made available to rural poor students. The project consisted of two phases. In the first phase students were trained to use computers to access the Ohio Career Information Service and a university on-line catalog. They then employed computers and the on-line services to develop a career plan which included occupational options, high school course selections, and possible post-secondary school training paths. In the second phase, at the high schools which elected to participate, students who completed the phase one training became eligible to take home complete computer systems with modems for extended loan periods. They used these computers to carry out school assignments, to access the on-line services and to participate in a home work hot-line computer bulletin board.

"Using the Computer to Improve Writing Skills and Promote Vocational Awareness in Specific Learning Disabled Students" -- Marietta City Schools. Dyslexic and dysgraphic students in three separate buildings (elementary, middle and high school) used word processing, keyboarding and other appropriate software along with a study of computer usage in the community to foster independence in writing skills. Using Appleworks, voice simulators, and modems, students cooperatively produced a tabloid of computer news and information. The auditory feedback of the voice simulators completed the multisensory approach needed by the specific learning disabled (SLD) students. At the beginning of the second semester of the project, students communicated via the modem to write articles, stories, poems, etc., focused on computer-related topics. Direct instruction was given in the writing process; writing, revising, editing, publishing. Using communication made possible by the modem a writing staff was developed. This student staff selected a format for the publication and solicited copy. Completed works were transmitted via the network to the classroom selected for final assembly. The completed publication was circulated to students, families, business visited, and other school personnel and classes.

"The Information Picture: The Telecommunications and Graphics Link in a Locally Developed Integrated Learning System -- Danville School District. Students in an economically disadvantaged rural district will use telecommunications to access on-line information needed for writing projects within the curriculum and will use computer graphics in written and oral presentations. This project adds telecommunications and increased graphics capabilities to the Writing and Research Center project in which the district is currently engaged. Telecommunications offers this rural and isolated district an effective approach to the automation of their small school library and its integration with information resources. Students participating in the project will be guided in on-line search techniques in order to add this important capability to their knowledge of card catalogs, print and microform indices. The students will use telecommunications to access selected databases through a gateway service, *Einstein*, to locate pertinent information for research assignments. All computers on the local area network (LAN) will be able to use a single modem.

"Mobile Telecommunications Lab Can Improve Student Information Retrieval Skills for Lifetime Learning" -- Maple Heights City Schools. The Mobile Telecommunications Lab is designed to help economically disadvantaged and developmentally learning handicapped students become more proficient in learning and applying information retrieval skills for lifelong learning behaviors. These students have limited instruction in the access and the availability of informational databases. A majority of these students take the basic required courses for graduation, are in special education classes and in vocational programs. A team of teachers will instruct these students in information retrieval skills by using a modem to access a variety of databases. Instruction and hands on training will be targeted towards: how to access information databases, such as *Dialog, Free-Net, Cleveland Public Library On-line catalog*, and *Cuyahoga Public Library On-line catalog*. Guidance will be given on what kinds of question to ask in a "search". Students will progress from how to use a modem and database to formulating a search strategy and applying it to satisfy academic or personal needs. Surveys and observations will be used to indicate that these students have significantly improved information retrieval skills for lifetime learning.

This use of telecommunications as part of the projects themselves produced the most exciting results. Because of the selection criteria, students represent a vast cross-section of the student population in Ohio, coming from urban, suburban and rural districts, all socio-economic levels, all developmental levels from special needs students to gifted and talented students, and all types of physical handicaps. Without telecommunications, these students would never get to know each other. Telecommunications opened up new friendships, new experiences and new ideas.

ELEMENTS THAT AFFECTED THE SUCCESS OF THE PROJECTS

1. **Technical Considerations**: These included ready access to a telephone line. This was quite a problem in many of our school sites. Some teachers solved the problem by putting their computers on mobile carts and taking the computer and the class to the office where a telephone connection was available. Typing skills were essential in projects where students were creating at the keyboard.

2. **Social Considerations:** Communicating with students in other areas was very motivating in our projects. In those projects which included a writing component, writing for an audience of peers was also motivating. Students exchanged pictures and in some cases arranged for face-to-face meetings. In those cases, prejudices were broken down when students met their "telecommunicating pals" for the first time. Boys found that they had been communicating with girls, whites with blacks, "normal" kids with handicapped students. Stereotypes were quickly forgotten.

3. **Time Line Considerations**: In communicating among districts, school calendars needed to be considered. Short projects with well-defined end points were most successful.

4. **Structural Considerations**: Projects needed to be carefully monitored by the teachers to keep the students on task. Writing needed ground rules, and all projects needed well defined procedures.

5. **Curricular Considerations**: Successful projects were related to the ongoing curriculum. In many cases, activities were preceded by off-line experiences.

SUMMARY AND CONCLUSIONS

The use of telecommunications in our Equity in Technology Project served a number of important purposes.

1. It enabled the staff of the project to communicate with the Local Action Project leaders. Without this component, it would have been very difficult for the staff to manage the large number of school districts which were involved.

2. It enabled the project leaders to communicate with each other, sharing information and ideas, creating the beginnings of a support network throughout the state.

3. It created a telecommunications network among the students who were part of the projects.

4. It was motivating to students both in computer skills and in other areas of the curriculum.

In summary, we feel that the use of telecommunications is an important adjunct to our project. We plan to continue the use of a telecommunications component in other ECCO activities. We have recently received funding for a science project which will involve ten school districts in northeast Ohio area. Part of our proposal was to supply each participating district with a modem and software, thus continuing our commitment to the use of telecommunicating in the classroom.

ECCO
Telecommunications Training Packet
Part 1

CHECK:

Before you start, confirm the following:

A. You have a **back-up copy** of the Datalink software (ECCO provides this; you use the backup copy rather than the original)

B. You have the **telephone number(s)** of bulletin board(s) you wish to contact during this session.

Here are three numbers which are likely contenders. ☞

Cleveland Free-Net 216-368-3888

WVIZ Learning Link
Cleveland 398-5571
Toll-free outside Cleveland 1-800-888-9848

John Carroll University 397-4303

C. Your **telephone cord** has one end plugged into the computer (actually, into the modem inside the computer) and the other end into the telephone line.

DO THIS.

Place the disk containing the Datalink software into Drive 1 and **turn on** your computer.

LOOK FOR:

You should see a screen which says: **Datalinker Communications Menu.** The menu has six choices, the first of which is **Run Datalinker.**

DO THIS.

Press 1. (It's not necessary to press RETURN) In doing so you are choosing to run Datalinker.

LOOK FOR:

The result will be a **lighted bar** at the top of the screen and a screen of information dealing with ways of using the modem to dial.

DO THIS.

Dig through your notes and locate the number you intend to have the computer dial right now. **Press Closed Apple - D.** This means hold down the key marked with a solid apple, and while doing so tap the letter D; then let go of both. (Look to the right of your space bar for the closed-apple key. If it's not there, substitute for the closed-apple key the **option** key to the left of the spacebar.)

LOOK FOR:

The result of doing this is a **box** in the middle of the screen. The box will be labeled: **Datalinker Dial Macro.**

Now it's time to make a decision. Do you have a rotary or a touchtone phone? If you have a dial, it's rotary. If you have pushbuttons, it's touchtone. Your actions at this point differ depending on which you have.

DO THIS.

If you have a rotary dial phone you must use **"pulse"** dialing and you should press **P for pulse.** If you have touchtone, you should press **any letter of the alphabet except P.**

Now, **type in the telephone number** which you intend to have the computer dial. You may use dashes if you think it looks nicer.

If you need to build a "pause" into the telephone number, you need to use a **comma.** (For example: 1,368-3888 will dial a one for long distance, pause briefly, and then dial the number itself. For another example: 1,,368-3888 will do the same thing with a longer pause after the one.)

Press RETURN after you have typed the number.

LISTEN FOR:

If you listen closely, you should hear the modem making beeping or clicking sounds; this is the actual dialing taking place. When the dialing is complete, you should hear one of two familiar sounds: that of the phone being picked up at the other end, or that of a busy signal.

If the phone is picked up at the other end, you should hear either a loud, annoying tone or high-pitched static. Either is the sound of another computer responding to your call.

DO THIS.

If you got the tone or static, press RETURN a couple of times; anything you see after that will be the words of the other computer responding to you. Converse with it as you see fit.

If you got a busy signal, press the ESC key (for escape) at the upper left of the keyboard. Then begin again at the point (above) where you pressed **closed apple-D.**

NOTE:
What happens once you begin talking with the other computer is a whole other issue -- and the subject of another ECCO training handout. For now, you are encouraged to experiment, especially with the three numbers listed at the beginning of this handout. Just to help you out, here's how to leave when you're ready. **When you're ready to hang up:**

1. Say goodbye to the other computer (it's different for each computer you call; keep tabs on the screen and at some point you will be told how to leave politely). If you're desperate, go to step 2.
2. Remove your Datalinker disk from the drive.
3. Turn off your computer.

That's it!

LEARNING THE "WRITE STUFF" THROUGH COMPUTER TECHNOLOGY

Debra Freedman, Jerry Stimmel, New York City Board of Education, U.S.A.

The world of educational computing has drastically changed in recent years and still continues to develop toward more inclusive but simple, useful and productive systems. It has a new set of characteristics and techniques which endow it with capabilities not previously demonstrated: it has created new alternatives in terms of teaching methodologies, strategies, techniques, instruments, materials and resources. Consequently, the development of the computer era has triggered a certain qualitative and quantitative modification in the whold world of human knowledge and in human capacities to acquire that knowledge.

"Tell me, I forget--Show me, I remember--involve me, I understand." Handicapped and speech impaired students have a unique problem. They grow up in a world where they are sometimes dependent upon others. Psychologically, this is often a greater handicap than the handicap itself. By using the computer, the students are able to experience a feeling of active participation. Special Education students need to be motivated and stimulated to want to participate in the changing technology. Listening, Speaking, Writing and Reading are part of the Communication Skills that we want to teach. This is done through the computer.

The project using the computer for Speech and Language has been ongoing for four years.

The equipment utilized for the project include, three Apple II+ computers with two printers, one Texas Instruments computer with a printer, the use of a modem at the school library.

The object of the project is to combine the TOTAL PHYSICAL RESPONSE with the use of the computer. TOTAL PHYSICAL RESPONSE is physical involvement, action and movement. Learning takes place when students are actually involved in the lesson. They understand the language they hear. Movement together with speech becomes part of first language acquisition. Therefore, we can use this method for second language acquisition and speech therapy. The approaches are Auditory, Visual and Kinesthetic.

The project is being implemented at Intermediate School 88 which is part of the New York City Board of Education. The school is located in Brooklyn, an urban area of New York City. The school's facilities consist of a main building and an annex. The microcomputers are located in the main building where speech therapy is administered.

The student population consists of middle to low-socio-economic status students; the school has a high bilingual population of which Hispanics are the predominant group. There is an increase in Arab and Chinese students.

There are approximately 56-60 students in the speech program. Under this category are included, mentally retarded, brain injured, physically handicapped, emotionally disturbed and visually impaired. In additin, the project serves some students from the mainstream classes who have problems with articulation and fluency. Common to both groups is a difficulty with [s] and [th] in all positions. This is referred to as a Lisp.

The fluency problems are referred to as stuttering. The learning disabilities of the participating students include dyslexia. These students have problems with auditory processing, auditory and visual memory and visual and auditory recognition.

When the project was initiated, the computer language LOGO was used to introduce the students to the computer. The language is "user friendly" and give sthe students confidence, self-esteem and a feeling of accomplishment. The students are learning through experiences and thus develop a framework for dealing with their environment. LOGO permits the students to control the computer without requiring mastering of programming concepts. With LOGO, teaching the language becomes part of the learning process. FIrst students are able to develop and/or acquire fundamental concepts in an effective and exciting manner. Second they take these concepts and procedures, investigate them and combine them to form new concepts and ideas. For example, the use of words--first single words, then phrases, then sentences. The computer is essential for the use of learning spatial relations, directionality, critical thinking and problem solving. This is accomplished through the graphics capabilities of the LOGO language.

When my students began to feel secure in the use of LOGO, other software was introduced. Through the use of word processing, the students were able to create a publication which they named BITS, BYTES AND PIECES. The students called themselves the "The Speech Wizards." The computer encouraged the "The Speech Wizards" to write and we acquired Pen Pals in upstate New York, California, Japan, Holland and Israel. We began to use electronic mail once a week with a neighboring school. This encouraged two students with non-fluencies to think about and discuss various conversations they were going to have via electronic mail. When the students become actively involved, interaction begins to take place, the therapist provides constructive criticism as to breathing techniques, articulation and grammatical structure. When all the senses are being stimulated, learning becomes a TOTAL PHYSICAL RESPONSE. Auditory (listening) Visual (looking at the monitor) and Kinesthetic (keying in responses). Social and Pragmatic skills necessary for everyday living are also being developed while the students are learning.

The capability for learning speech and language through computer technology can enhance an educational program. It is not only the technology that makes the project successful, but the wonderful expressions on the faces of the students, their feelings of personal worth and a positive self image. The students feel a sense of accomplishment and independence which is essential for handicapped students.

Computer technology is useful in the design and implementation of a language curriculum. It allows for the use of software to teach verb tenses, using a technique in which students can learn while thinking it is a game. Teaching is more diversified. The teacher instructs part of the time, then tutor those who need individualized instruction.

Discipline problems are reduced to minimum due to the students' involvement with the computer. Thus the environment becomes less disruptive and more conducive to learning activities. The pressures usually presented in a traditional situation are minimized when a computer is employed. Learning becomes more fun, more gratifying and less burdensome for the student.

Examples of students who are enthusiastic about using the "write stuff" with computer technology are Harold, Adam and Thomas. Harold is a fourteen year old adorable child who was diagnosed as having verbal and motor apraxia which interferes with his ability to use sign language effectively. Formal tests indicate that Harold's mental age is three years eight months . Harold can produce some sounds in isolation along with most vowels.

Harold has limited expressive skills and few pragmatic skills. Harold had no previous knowledge of the computer before he came to speech class. With his limited comprehension, he was taught to hold the disk, turn the computer on, place the program into the computer and wait for the program to begin.

When Harold was first introduced to the computer, he looked at the keyboard and signed and articulated the word computer. Harold was presented with the software called Concentration. This is educational gaming software that allows the user to acquire visual memory while matching the boxes. Sound is involved. This learning experience becomes a Total Physical Response. Auditory, Visual and Kinesthetic skills are combined. After explaining the concept to Harold, he was able to comprehend the directions and was able to say each number before pressing the keyboard. At times, he would sign the number before pressing the keyboard. The smiles, the joy, the happy expression that was on Harolds face was a delight. He felt that he wasn't different, he was able to accomplish his task.

As Harold became familiar with the keyboard, word processing was introduced. The speech class was discussing writing to Pen Pals in Israel and Japan. Harold understood that he wanted to write a letter to Israel. We discussed where Israel and Japan are and Harold said in his own way, "I want to write". "Help me write." The letters were dictated and Harold was able to keyboard them into the computer. Harold was also able to write his name to the letter.

Harold's abilities are limited. We know that he could never achieve the same as a student in the mainstream, but through the use of computer technology, he is able to comprehend and communicate and not feel that he does not belong. For Harold, we recognize that the computer is a tool that can be useful in all his academic disciplines as well as problem solving. What the computer does for Harold is individualize his learning. It allows him to work with another student which stimulates his desire for communication. It will be able to diagnose his responses by attempting to determine his style of learning. This will determine his optimal learning style, e.g. Does Harold learn best from his peers? It was noticed that if there are more than four students in the speech room, (there are a total of four computers in the room), Harold will get distracted and want to know what is going on at each computer. The natural inquisitiveness is positive for Harold's learning language. For problem solving, LOGO and Print shop are being used. Electronic Mail was not used with Harold. The modem is not connected to the speech room, it is in the library which makes it difficult for Harold to travel.

Adam and Thomas are using Electronic Mail. They are able to communicate with another school in New York City

Both Adam and Thomas have speech dysfluencies (stuttering). They are both in mainstream (general) education classes. Adam is in the 7th grade and Thomas is in the 8th grade. Thomas will be graduating this June. He will be attending art school. Adam is quite shy and has many problems at home. He began stuttering at age 2-1/2 years old, six months after the onset of language. His articulation is good and phonation is within normal limits. His language reception and expression are on grade level. He is able to converse, follow directions, describe abstract concepts, and solve cause and effect problems. He is diagnosed as a primary stutterer, there are no secondary symptoms, which means no facial grimaces. He is aware that he is stuttering and feels he is a poor speaker. As a result of this, Adam tends to be a "loner". He does however, speak to Thomas. They have been in Speech class together since elementary school. Adam usually has simple repetitions on monosyllabic whole words and initial syllables of polysyllabic words.

Thomas is a primary stuttererer, who has been stuttering since 4th grade. Thomas doesn't seem to have any problems at home and is also aware of his non-fluencies. The therapy for both students is the same, trying to make them aware of when they are going to stutter, then have them take a breath and speak on the breath,. Discussions as to when they feel a block (stutter) is important. The students converse when they are using the computer. The software that is implemented in their therapy program consists of programs that allow for conversation and problem solving concepts which tend to enhance discussions. LOGO is one problem solving language that is very effective with any type of student and is especially useful for students with an interest in the computer. Thomas and Adam use LOGO for creating different learning environments including graphics and text. LOGO offers a way for students to "think about thinking" to explore powerful ideas and to fulfill self-initiated goals. The software "An Experience with Artifical Intelligence has been very helpful in stimulating conversation between Thomas and Adam. This allows the users to exercise visual recognition techniques. The Artificial Intelligence program demonstrates Artificial Intelligence through game format. (Artificial Intelligence can be defined as a process where machines "imitate and simiulate" the human mind; where the computer can act as an expert system.) The students employ a variety of problem solving techniques which is stimulating for communication, essential for Adam and Thomas. Artificial Intelligence poses the question of whether computers can learn or be taught to "think" like human beings. It is a question that provokes much debate among philosophers, computer scientists, and other interested observers.

Our interest in computers, led us to become involved with Electronic Mail or Electronic Messenging. This is exciting as we can receive mail from Pen Pals in New York City immediately. Through communicating information about themselves to others, Adam and Thomas learned more about their own communities. Research had to be done on the questions that their Electronic Pen Pals asked . Students had to use the Atlas and newspapers to find the information that was requested by their Penpals. Students' writing skills improved. They had the opportunity to write, they were encouraged to write about subjects which interested them, and they had a real audience. They began to take pride in their work and most important in themselves. At the beginning most students displayed resistence in learning typing skills, but because of their motivation to communicate, they are learning to type. These skills, are essential in any future career.

The only problem we confronted was, the modem is located in the library, not in the speech room. This is a major disadvantage, as we can only go on-line certain times and days of the week. But, I hope next semester, we can have the modem connected to the speech room. The reaction of Thomas and Adam when they are on -line is rewarding to see. The comments, "Wow, I can't believe they are so far away." The conversation consists of introducing themselves at the beginning of the sessions. The other school often has different students communicating each week. If the students are the same, there is conversation about when they will meet each other; what are their favorite sports; how their leisure time is spent and summer vacation plans.

Our Pen Pal correspondence shows a warmth, friendly concern for each other, and a knowledge and curiosity about each others country. Adam and Shin are excited about the correspondence taking place. Adam is able to read his letter to me with enthusiasm, with the least amount of stuttering blocks. Harold, with no verbal language was able to express joy when he tried to read the letter by himself from Ifat and Udi. Harold can process the information that he hears. Therefore, when the letter was read to him, he was able to understand what Ifat and Udi wrote. He knew which one was sixteen years old. All of the correspondents are excited about writing they feel important. They show feelings of accomplishment along with high self esteem, knowing they are part of something.

The new technology brings with it questions and attitudes from people who are not interested in knowing what is going on. "Will computers help students enter the job market?" "Computers are just like video games?" Are the students just playing?" It is the newness of the technology, particulary in education that makes it difficult to answer these questions at this time. However, that should not stop us from searching for the best ways to apply this technology in education. As time passes, we hope that educators will become more familiar with this new technology and we can bring new perspectives and answers to the questions.

The project assists the students in learning how to manipulate the computer, thereby encouraging them to use application software as well as creating their own interactive programs with LOGO. In other words, the students are getting computer literate while "learning the write stuff" which eliminates the fears of this new technology.

The project has also shown that the integration of the microcomputer into the environment is a postitive approach that promotes motivation to learn. The students' progres is demonstrated by informal and formal tests which indicates an increase in their communicative language skills. Using computer technology is a challenge, not only to the students, but to the professionals involved in the educational field. What must be accomplished is to learn, become excited and share our experiences with others so as to improve the quality of education, not only in the United States but throughout the world, making this a Global effort. This will build a better technological basis for education into the 1990's.

MAY 8, 1989

DEAR IFAT AND UDI,

MY NAME IS HAROLD. I GO TO SCHOOL IN BROOKLYN. I AM LEARNING SPEECH AND THE COMPUTER. I LIKE TO GO TO SPEECH.

I WANT YOU TO WRITE AND TELL ME ABOUT ISRAEL.

WRITE SOON.

YOUR PENPAL

HAROLD
HAROLD

May 17, 1989

Dear Harold.

Hi, I'm Ifat and I'm 18 years old, my brother Udi is 16 years old. We go to the same highschool in Ramat-Hasharon, the town we live in

Ramat Hasharon is by the beach and because its very hot now we go there often, there are a lot of beautiful beaches in Israel.

Jerusalem is the capital of Israel, and its very old and holly. we like to travel there and also we travel in the desert in the south and in the north which is full of rivers a forests

Our town is near Tel-Aviv which is the largest city in Israel and very lifeful, a lot of shops, pub's, disco's and so...

I was in New-York 3 months ago and I enjoyed very much

Udi likes to do sport and I like to read

write back, Your Penpal

Ifat (& Udi)

5/16/89

Dear Shin,

Hi, it's me Adam. I go to school at I.S. 88. My school is in Brooklyn. I have to take buses to get to school. I have to transfer once.

You asked me to tell you about our holidays, so I'm going to tell you about them. One holiday we have is called Christmas. On this holiday, which is held on December 25th , people all over the United States put up trees, and give presents. There is one other holiday, it is called Memorial day. It is held on May 29th. It is in honor of the soldiers that died in the war. There are many more holidays in my country and I will tell you about them the next time I write. I well send you my picture next time.1 Can you send me your picture?

Your pen pal,

Adam Caballero

May 23. 89

Dear Adam,

I am really glad to recieve your letter again.

You know Adam, I really learn from you a lot. How to write letters in English. The exstance of the memoriable day. And you also taught me how nice it is to have a penpal. I'm feeling really well!!

Today it's raining. In Japan, we have a season which gives us a lot of rain. Mainly it happens in July. It becomes humid. My clothes get wet. So I don't like it. But without that we'll lack a lot of water during the summer time.

Please tell me if you have these kind of seasons in the States.

Yours,
SHIN.

Dear Adam,

Hi there! How are you? I'm very fine. I work in a Japanese company. My office is in Tokyo. I take trains to get there. But I have to transfer two times.

Today is a holiday. It's the day when the constitution was declared.

Tell me about the holidays in your country. Also about your school.

Your pen pal
SHIN OKUBO

6/5/89

Dear Shin,

I am really glad to be writing to you again. We have a season that gives us a lot of rain also, It is called fall [autumn]

Another season we have is called winter. This season gives us snow instead of rain. Children play whith the snow, they have a game called a snowball fight, they make teams, take some snow and make it into a ball, and throw them at each other.

We have another season called spring. This season is a very warm season. Flowers and plants bloom. We have one more season, this one is called summer. During this season children are finishing school. The last day of school is during this summer. The last day of school is on June 28th.

On the last day of school we get a summer vacation. Do you get a vacation? If you do, tell me about it.

Write again soon.

your penpal,
Adam

MODEMS, DISTANCE AND COMPUTED ASSISTED LEARNING

Manfred Hanke, University of Windsor, CANADA

Abstract

With the tendency away from the use of main-frame technology, this paper examines the use of micro-to-micro communications and how a micro computer can be set up to act as a host computer for courses using the distance education delivery mode. Two different perspectives are presented: from the student's and from the instructor's.

It was found that in order for computer-based distance education to be successful, three main factors had to be considered: (1) mode of access to the system, (2) CAL course development capabilities, (3) availability of support resources.

Background

In 1983, the Ontario Ministry of Education set out specific hardware requirements for approved computers for use in Ontario classrooms. These specifications included the latest technological innovations: local area networking, a multi-user/multi-tasking environment, 16 bit microprocessor.

Because of the introduction of this new technology into the classroom professional development was necessary for the teacher who would be instructing the students in the use of this new equipment. One university credit course (a site administrator's course) was developed and delivered through distance education mode using a combination of modes but primarily print-based.

With the increasing use of data communications, there was a perceived need to offer some sort of professional development for these teachers.

Essentially, there were four objectives for the "modem" course:

1. obtain a basic understanding of some of the common parameters and protocols used in computer-to-computer communications,

2. learn how to connect modem hardware to the fileserver that was at their own site,

3. use QNX (the resident operating system) command to control the modem and communicate with remote computer installations,

4. set up their ICON system to act as a host computer and develop their own CAL program that could be accessed remotely.

It was believed that the hands-on approach that made the site administrator's course so successful would be adopted for the modem course.

For the student, the hardware pre-requisite was an ICON system, a modem and cable. Their system would be used to set up their own distance education learning centre.

The Host Computer System and Software

The host computer that the students were setting up and the host computer that the students would be accessing here at the university were basically identical. The only difference was that their system would be accessible through the local modem that was attached to their system whereas the university's computer could be accessed through a packet-switching network (See Appendix A).

The host software, ICONET, was distributed as part of the first component for the course. Because the electronic mail, computer conferencing, file utilities, and CAL development components that comprise ICONET are identical from within the network or via modem, the students were given instructions so that they could load it on to their system. This would allow them to become familiar with the various features and commands.

The ICONET host software, developed by me, essentially consists of the following modules:

mail: Similar to other electronic mail on mainframe computers. Provisions are made which allow for verification of receipt of mail back to the sender, carbon copies, bulk mail.

conference: This allows for different levels of participants: convenor, moderator, and delegate each which different levels of power and capabilities. Open and closed conferences can be established which allow or restrict access to sensitive information.

learn: This is used to develop and deliver computer assisted learning programs using the PILOT authoring language. A dynamic tracking feature allows the teacher/developer to follow the exact path that the user follows through the course and hence makes diagnosis very easy.

chat: Chat allows for synchronous user-to-user computer communication.

autoanswer: This is the autobaud front end program which reconfigures the host system's serial port according to the communication parameters dictated by the incoming call.

utility: Files can be sent and received and if permission has been given allows users access to the system commands.

Within the ICONET program, on-line help is readily available.

Course Delivery

As part of the course material the student received the written instructional material, a copy of ICONET software and the supporting documentation, and (depending upon their location) an INET account.

The course was divided up into three components: networking, remote access, CAL development.

The written support materials sent to the student for the "networking" component outlined parameters and communication techniques. The students also received a copy of ICONET as part of the first component.

The second component of the course required the student to access the university's ICON system and perform a number of tasks including transferring information from the university's system to their own, making changes to the file, and then transferring the altered information back to the university system.

In the third component they were required to set up their own ICON system to allow for remote access. I (as the course instructor) accessed their system and examined the computer assisted learning program that they developed.

At the conclusion of the course, a written final examination (a requirement of the university) was completed by each student.

Results

On the whole, the course went well except for the time factor. It was apparent from this course that in order for this mode of delivery to be successful, the student must be familiar with the mode of delivery technology (in this case the computer).

The philosophy in the development and delivery of this course was "use the technology to teach about the technology." Overall, this objective was met. The instructional materials and exercises that were sent to the students instructed them in how to use the telecommunications technology and how to use that new knowledge in accessing remote systems.

The ICONET host software performed admirably. The menu-driven options and on-line help did much to alleviate user discomfort and anxiety.

In order to evaluate the project, the criteria outlined in the document "The Distance Education Planning Group Criteria for Assessing Appropriateness of Delivery Systems." was used. Each of the criterium is examined and used to evaluate the course and the ICONET program as a host computer for distance education purposes.

(1) Accessibility: ICONET is hardware dependent. This was one of the concerns that Kearsley (1985) expressed about system compatibility. The only requirement is that the user's terminal be capable of displaying 80 columns.

(2) Equity: The use of INET 2000 networks means that user costs are absorbed by the institution rather than the student and that the costs are identical regardless of the physical distance that the student is from the host system.

(3) Cost Effectiveness: ICONET is user friendly. This means that the student does not have to spend time looking up things in the manual while connected to the remote system.

(4) Flexibility: All of the normal conference-related activities such as adding delegates, reading and editing conference entries, etc., can be done from a remote location. The options that are available from within the network are identical to those for users who access the network from a remote location.

(5) Anonymity: It is not essential that anyone knows who is logged in and at what time. However, careful measures have been taken which prevent unauthorized users from accessing the system, reading confidential conference entries, or writing obscene or threatening letters.

(6) Social Geography: Control for the system remains in the local domain and yet the physical distances involved are completely transparent to the user.

(7) Assessment: Within ICONET, the **learn** features automatic tracking allows for the monitoring of student progress through a course.

(8) Evaluation: Changes are being made to ICONET in order to accommodate the diverse needs of both the novice and more experienced user.

What Has Been Learned

Time Management and Course Length: It would appear that the greater the number of layers of technology that are added, the longer the time needed on the part of the student to complete assigned work.

Hence, print-based materials are the most easy to "digest" for the student because that student already knows how to read. If technology is to be used, there is some teaching that must precede the student's actual learning phase. However, once this initial technological familiarity has taken place, the new learning can be more efficient.

Student Support Mechanisms: It is essential that students have a continuous support mechanism which helps them to alleviate either technical or learning difficulties they may encounter[1]. In order of importance and effectiveness (and gratifying for students) were

(1) telephone support (with answering machine, if necessary),
(2) electronic mail (once users were accessing the system),
(3) computer conferencing (this was used among all of the students).

Quality of Instructional Material: The learning materials must be concise and succinct in their content. Favour practical over the theoretical. The type of student must be taken into consideration. Adult learners have less "disposable" time that can be devoted to coursework.

Entry-level Knowledge: Because of the diverse knowledge levels of students, its is essential that the course be developed around the lowest common denominator. If corrections or alterations must be made in the course material, it is less frustrating for high-level students to lower their sights than it is for low-level students to be exposed to advanced material.

Uniformity of Hardware: If possible, attempts should be made to standardize both hardware and software. Fewer variations allow for a greater number of teaching approaches that may fit the learning style of the student.

---

[1] See Hodgson (1986) for the effect of two different methods of support on the results in a distance education course.

Select the Appropriate Technology: Don't use technology because it is there and you are expected to use it for the delivery of the course. Be selective in the mode of presentation of the instructional material. Use print-based material where it is appropriate (Bates, 1988). Use computer technology to enhance learning where other modes might not be suitable.

In summary, therefore, the delivery of a course using modems is feasible. However, certain cautions must be built into the course which makes the course more enjoyable for the student and less frustrating for the instructor.

References

Ministry of Education. Report of the Distance Education Planning Group on A Delivery System for Distance Education in British Columbia. Victoria: B. C. Ministry of Education, 1977.

Kearsley, Greg. "Networking Computer Based Instruction." Education and Computer, 1, 1985, 109-116.

Bates, A. W. Keynote Address, Lakehead University Distance Education Symposium, March 1988.

Hodgson, Vivien. "The Interrelationship Between Support and Learning Materials." Programmed Learning and Educational Technology, 23, 1, February 1986, 56-61.

Appendix A

	DIRECT ACCESS	PACKET-SWITCHING NETWORK (Datapac, eg)	INET 2000
Description:	Normal system access using modem.	Packet-switching network in which users share lines to transfer data information only.	Includes packet-switching network but initial contact is established via toll-free telephone number.
Guest Computer's Hardware	Modem	Modem.	Modem.
Host Computer's Hardware	Modem.	Modem and Packet Assembler-Dissassembler Hardware (X25 PAD).	Same as packet.
Cost to User.	None, except if long distance toll charges apply or if local calls are on a charge per call basis.	None, except if long distance toll charges apply to access the closest packet-switching access node.	Hourly rate. Distance independent.
Cost to Host.	None. Dedicated phone line should be installed.	Basic monthly charge. Additional charges based on the number of packets sent to and from host site. Charges are distance dependent.	Basic charge as "Information Service Provider."
Advantages to User.	Full-duplex operation. Relatively fast and error free. Some line noise may occur.	Free. No costs involved unless a bill back from host.	Can be used to access a variety of on-line services. Charges are fixed.
Disadvantages to User.	None.	Must be on a packet-switching node. In most cases only half-duplex operation is possible.	Can be cumbersome to the unitiatated.

ONLINE EDUCATION: A NEW DOMAIN FOR COLLABORATIVE LEARNING AND COMMUNICATION

Linda Harasim, The Ontario Institute for Studies in Education, CANADA

Online education, the use of computer communications for education, is an unprecedented new domain for collaborative learning. Educational institutions in Canada, the USA, and Europe are increasingly adopting telecommunication technologies such as computer conferencing for delivery of formal and nonformal group learning activities. Computer conferencing is a group communication technology which facilitates many-to-many interaction and collaboration among geographically distributed individuals (interaction is time and place independent). Among the most significant benefits of computer conferencing for education is its potential for expanding access to learning peers, experts, and archival materials and user control over the time, place, and pace of the interaction. The mediation of the computer, moreover, introduces new tools to amplify intellectual activity and improve metacognitive skills.

This paper reports on research into instructional strategies for facilitating active and purposeful learning interactions online. It presents a case study analysis of the use of computer conferencing for delivery of formal group learning activities (electronic seminars, online learning partnerships, working gorups and debating teams) within five graduate level courses. The paper introduces a theoretical framework for understanding online education as a new domain and identifies the key attributes that characterize this new environment, with particular attention to their implications for designing collaborative learning environments and strategies. The paper examines: 1) the design of online learning groups; 2) the rate, volume, and patterns of learner participation and interaction; 3) the nature of cognitive interactions in various group activities; and 4) user reports of issues that contributed positively and negatively to online learning collaborations.

The location for the data collection is the Ontario Institute for Studies in Education, the first institution in Canada and the USA to offer graduate level courses entirely online. Both quantitative and qualitative data are provided. Quantitative data include system generated usage data (volume and rate of user participation) as well as analysis of user responses to four sets of online questionnaires. Each questionnaire explored a different aspect of the online collaborative experience, ranging from course design and organization of online communication to technical problems. Qualitative data include participant reactions which were collected through participant observation and user comments sent to informal course conferences established for this purpose. Hypertextual transcript analysis lends insight into the content and cognitive processes of online learning collaborations.

The research described in this paper indicates that with careful attention to educational design, online education contributes to active, purposeful, and democratic learning interactions: an augmented educational environment. By describing on-line course designs and analyzing data on the nature of the learning interactions, the paper contributes towards developing a base of knowledge which can inform future activities in online education.

DISTANCE LEARNING IN THE CARIBBEAN

Dennis Harper, University of the Virgin Islands, US Virgin Islands

Background: The University of the Virgin Islands is the only institution of higher education in the Virgin Islands and also serves students from the Eastern Caribbean region including the British Virgin Islands, Dominica, St. Lucia, Antigua, Trinidad, Grenada, St. Kitts-Nevis, Anguilla, St. Maarten, and St. Eustatia. UVI has a major campus on the island of St. Thomas and a smaller campus on St. Croix. The enrollment of the University for the year 1988/89 is 1494 full time equivalency. Approximately 90% of the student population is Black, and women constitute 75% of the full time enrollment.

Limited resources and the geographical isolation of the St. Croix campus from the St. Thomas campus have made it difficult to deliver more than a very basic core program of courses to the St. Croix campus. Distance learning has been identified as a potential cost effective approach to increasing services on St. Croix as well as to other island nations of the Eastern Caribbean. Audio conferencing, electronic mail, and linked computers form the technology backbone of the university's efforts in distant learning.

Courses between St. Croix and St. Thomas have proven very successful during the past three years. UVI expanded its distance learning offerings to the British Virgin Islands in January of 1989 when it delivered three courses (Introduction to Computers in Education, Data Processing and BASIC computer programming). These three courses are aimed at developing teachers' skills in the area of computers and technology. Courses are taught on St. Thomas and students on St. Croix and Tortola, B.V.I. participate simultaneously. A new master's degree emphasis in computers and technology in education was designed with distance learning in mind. The U.S. Virgin Island of St. John joined the University network in June of 1989 with teachers on that island taking a course entitled "Computer Applications in the Schools".

Plans are under way to expand UVI's distance learning offerings beyond these four islands to include other Eastern Caribbean islands in January of 1990. UVI faculty representatives visited St. Kitts-Nevis, and St. Maartin in mid-January of 1989 to discuss potential distance learning classes. UVI now has the potential to link up to eight classes simultaneously.

Although present efforts emphasize teacher training and upgrading, many disciplines are potentially addressable using distance learning techniques in the Caribbean. The educational needs of a particular community or region are the primary criteria as to the type and content of distance learning courses to be offered in the future.

UVI's distance learning hinges around five technologies. These technologies are employed because of their efficiency as well as effectiveness. Each remote site has two regular telephone lines.

1. **Phone bridge** - audio link to a nearly unlimited number of remote sites.

2. **Computer connection** - Up to eight computers can be linked together. When any one location types something (or uses a graphics tablet input) on their Macintosh, the other locations see the graphic on a large screen projection unit. If either the phone or the computer connections is broken, the other can stand by itself.

3. **Electronic mail** - All students, facilitators and instructors have E-mail accounts to send assignments and questions.

4. **Fax machines** - Each remote location has a fax machine.

5. CD ROM - This technology will be implemented in the coming semester. Each location has a CD ROM player along with CDs that contain a variety of general and education information.

In addition, video tapes are produced at the host site and sent to remote sites. We have found that students benefit more if the instructor alternates between the remote sites. Thus far, we have only delivered courses to three islands simultaneously. Another finding is that students from remote locations who have taken a series of distance learning courses begin to recognize the voices of "classmates" they cannot see and conversations become more frequent.

In another experiment, three remote classes were bought together on one location for the first week of the course. The remainder of the course went exceedingly well as the students knew each other both academically as well as socially, and were more willing to interact across the distance.

Periodically, panel discussions are held between the all sites and "experts" from the United States and Canada using teleconferencing techniques. These panels have been very well received.

Support personnel consists of one instructor, a facilitator on each remote site (occasionally a member of the class), and a media specialist who helps create materials and set up the distance learning equipment. Faculty are given an extra half-course credit for teaching such a course.

Over the past three years, an average of five courses per semester have been taught using distance learning techniques. These course have been primarily in computer education and computer science. English, environmental studies and marine biology courses have also been taught remotely. Future plans include:

- UVI is rigorously pursuing additional funding to expand the quantity and quality of it distance learning efforts.
- Expanding to St. Kitts/Nevis and St. Maarten during 1990.
- Bringing additional courses to remote sites.
- Development of a better graphics tablet interface.
- Developing a stronger inter-library loan service.

For further information please write to Dr. Dennis Harper, University of the Virgin Islands, St. Thomas, U.S.V.I. 00802. Phone (809) 775-1965, Fax (809) 776-2399, Bitnet D_HARPER@UPRENET.

THE ELECTRONIC ACADEMICAL VILLAGE: CREATING PROXIMITY ELECTRONICALLY FOR CULTURE BUILDING

Judith B. Harris, Glen L. Bull, University of Virginia, U.S.A.

Thomas Jefferson's architectural plans for the University of Virginia, developed in the early nineteenth century, declared that

> It is infinitely better to erect a small and separate lodge for each professorship, with only a hall below for his class, and two chambers above for himself; joining these lodges by barracks for a certain portion of the students, opening into a covered way to give dry communication between all of the schools. The whole of these arranged around an open square of grass and trees, would make it, what it should be in fact, an academical village, instead of a large and common den of noise, of filth and of fetid air. It would afford that quiet retirement so friendly to study, and lessen the dangers of fire, infection and tumult.
>
> (American Passages Series, 1987, pp. 14-15)

Jefferson was the first American university architect to use building blueprints as plans for academic interaction. He attempted to create an academic community by placing professors from all over the world and their students in close and pleasant physical proximity. The result was so successful that the American Institute of Architects has ranked Jefferson's design among the nation's top ten architectural achievements.

In Jefferson's academical village, geographic proximity led to academic interaction and cultural exchange. He went so far as to invite cooks of different nationalities, such as Italian, French, and Spanish chefs, to work in the dining halls of pavilions built in corresponding architectural styles, and to require that the history, literature, and philosophy of many different Western European nations be included in each student's course of study.

Jefferson was an innovator of considerable note. Many of his designs, such as the dumbwaiter at Monticello, have operated for over 100 years without replacement or repair. Many of his ideas, such as the positive correlation of proximity to community building, are similarly robust. With this background of invention, Jefferson might have been intrigued by the thought of bringing learners together electronically as an alternative to moving them to a common geographic location.

Almost two centuries after Jefferson began work on his design, an "electronic academical village" is being developed in the Curry School of Education at the University of Virginia. The blueprints for this structure display an international computer network, rather than a housing plan for internationally-acclaimed professors and their classes. Yet the inspiration for each century's interpretation of the academical village concept is similar: to facilitate and enhance communication among teachers and learners.

The need for communicative proximity is particularly acute for a school of education, because the necessity of working in the public schools means that professors and students in the education school are geographically scattered as they perform or supervise teaching internships. The logistical considerations posed by coordination of the student teaching process could give pause to an army. The problem is the same in each case: communications. For example, suppose that a student teacher needs to consult her faculty advisor at the university. She may call her advisor during her lunch break, but, of course, the professor is in a meeting or teaching a class. The faculty advisor calls back later that afternoon, but now the student teacher is back in the classroom. With skilled players, this type of "telephone tag" may continue for days.

Teacher-LINK

In early 1986, two professors from the Curry School encouraged several of their students, who taught in local public schools, and a few of their colleagues at the university to use a simple electronic mail system to alleviate some of the inconvenience described above. The trials were so successful that the professors proposed a cooperative exploratory study to IBM's ACIS (higher education) division to further investigate the possible impact of a computer network upon the student teaching process. IBM funded the three-year project in late 1986 with approximately 1 million dollars of computer hardware and software. This included an IBM 4361 mainframe running the VM/IMS operating system, 100 portable computers with built-in 1200-baud modems, monitors, printers, and a wide selction of personal productivity and instructional software.

The Curry School agreed to fund support personnel positions for the project from the school of education and Academic Computing's User Services division. Additional university grants provided a networked computer classroom for participant workshops, and a site license for ProComm, the telecommunications software used for the research. MetaSystems Design Group, Inc., donated an electronic conferencing program (Caucus) to complement the electronic mail facilities. Centel, the local telephone company, agreed to fund approximately one-half of telephone line costs to give each of 40 participating public school teachers and their interns telephone access in their classrooms. The two local school systems (Charlottesville City and Albemarle County) agreed to absorb the remaining telephone and incidental costs of the network. "Teacher-LINK," as the project was called, thereby became the first pavilion of the electronic academical village.

Classroom Applications

But Teacher-LINK, instituted to enhance the teaching internship, is only one element of a larger vision. Once a communications link has been extended between the classroom and the university, many other facilities can be accessed. The university network is linked to other networks across the nation. A network known as BitNet stretches across the United States, and has links to other networks in foreign countries. Access to BitNet has encouraged teachers and interns to help their students electronically communicate with teachers and students in other states (such as Alaska, California and Florida) and other countries (such as Israel, Denmark, and Spain).

The original Teacher-LINK project has served as the platform for establishment of a more comprehensive academical network. Following are brief descriptions of telecommunications applications that have emerged quite naturally as teachers and students experiment with this powerful new technology. We suspect that the wide scope of innovative projects that have begun in the 2.5 years since Teacher-LINK's inception will prove to be mere portents of eventual instructional telecommunications applications.

Science Applications

As a result of experimental use of education networks, an invitation was extended to the Curry School to participate in a pilot of the National Geographic Kids Network project. Two hundred classes in this country and abroad used a common network to participate in a joint study of acid rain. Students transmitted data collected to a central site via the network. The sixth-grade class of Gerry Burnett at Broadus-Wood Elementary School in Albemarle County, VA participated in this pilot in April 1988, and is now engaged in beta testing of future experiments developed at the Technical Education Research Centers (TERC).

The StarNet Project extends the NGS Kids Network to the high school level. The Curry School of Education is one of ten StarNet Centers in the country. A description by Bob Tinker, president of TERC, outlines the intent of the project:

> An approach we have termed microcomputer-based laboratories, or MBL, uses the microcomputer, equipped with a small array of transducers and general-purpose software, as a universal instrument performing the functions of storage-tube oscilloscope, counter-timer, frequency analyzer, and other devices. Easy-to-use software makes these functions readily available to the student. The computer is also a universal tool for analyzing, comparing, storing and graphing data, as well as generating models and exploring theories. Telecommunications can bring students together to cooperate in conducting projects and setting up data collection networks that are much more complex and sophisticated than

> any one student could handle alone. (Tinker, 1986, p. 3) Thus, MBL increases student capabilities and productivity while reducing costs, and telecommunications technology fosters collaboration and reduces the demand on each teacher.

At one time, dissection of a frog was a standard component of high school biology classes. For a variety of ethical and practical reasons, this is no longer the case. Richard Strauss, a doctoral student in the Curry School, and Jean Foss, a biology teacher at Western Albemarle High School, are collaborating on development of a replacement exercise which combines videodisc and computer technologies.

Jean Foss describes the project in this way:

> This interactive videodisc deals with dissection of a pithed frog. This topic is of great educational value to students of the life sciences. It is, unfortunately, one which I no longer offer to my students due to the use of live frogs. Successful completion of this project would provide me with an acceptable means of offering this learning experience to my students. The planned interactive nature of this lesson will make it much more useful than other learning materials on frogs which are currently available.

The network is being used as the medium for interaction on this project, and makes a joint collaboration possible. Programming code developed by one author can be sent to the other in seconds over the network. This pilot study was so successful that Apple Computer, Inc. funded a hypermedia study in which Instructional Technology students at the Curry School work with local high school science teachers to develop, fieldtest and disseminate interactive videodisk projects modeled on "Operation Frog."

Special Education Applications

In 1986, an initial group of twenty special educators and clinicians in communication disorders met in Charlottesville, Virginia to establish an electronic conference. The Special-Talk conference, devoted to discussion of technology in special education, was established on the CONFER electronic conferencing system. (CONFER is a system which resides on a mainframe computer at the University of Michigan.) The original electronic conference has now grown to more than 100 clinicians and special educators. The Educational Technology committee of the American Speech-Language-Hearing Association now uses the conferencing system as the official vehicle for conducting business, as does the board of directors of Computer Users in Speech and Hearing (CUSH).

Through a grant from Metasystems, Inc., it has been possible to establish a conferencing system similar to CONFER at the University of Virginia. This conferencing system, called

Caucus, has been used for several projects such as KidLINK. KidLINK is an electronic conference initiated by doctoral student Sue Anderson, which originally linked hearing-impaired students with non-impaired classes, and now joins classes of all types and ages from neighboring schools in Charlottesville and Albemarle County. A similar forum for high school students ("Jam,") organized by student teacher Brian Jablonski, grew out of older students' participation on KidLINK. Other conferences on the system were established for students in instructional computing, adaptive physical education, and educational research classes, so that discussions need not be limited to in-class time. Albemarle County and Charlottesville City teachers and interns also use this friendly conferencing system to share lesson ideas and ponder educational issues of all sorts in an organized public forum called the "Lounge," the system's most popular conference. The project's evaluator, doctoral candidate Sue Eskridge, has even established a conference for cooperative exchange of project evaluation ideas.

Applications in Language and Social Studies

Student poets at Burley Middle School are learning to use the conferencing system to cooperatively process each other's poetry. With the help of graduate student Marshall Chase, they post their creations as items on a poetry conference, then use item responses to provide constructive feedback on each other's writing and post poem revisions. Caucus keeps a written record of revision progressions, all of which can easily be contributed by and shared with classmates, teachers from other schools, and student teaching interns.

Students on the network can also communicate with "Soup" (from the Robert Newton Peck books for children), "Miyax," an Eskimo protagonist from Jean George's Julie of the Wolves, "Ralph," the mouse from The Mouse and the Motorcycle, "Stuart Little," another literary mouse whose story was recorded by author E.B. White, and an ever-changing variety of other fictional characters. As classes read novels, students deepen their understanding of themes, motivations, and story development by actively communicating with the characters about whom they are reading. This interaction adds to the reality of the character and leads to a more comprehensive exploration of the novel. The protagonists are actually electronic roles played by student interns, graduate students, and professors who are often glad for the excuse to read or reread children's literature in preparation for electronic impersonation.

During the spring of 1988, a ninth-grade basic English class agreed to "help" a third-grade class by corresponding with them using the E-mail system. The third-grade class was delighted with the attention from high school students. The ninth-graders found writing meaningful and purposeful, because of the genuine communication which was occurring. In the spring of 1989, kindergarten students corresponded with central office personnel in the Albemarle County schools about everything from summer vacation plans to county school policy. The challenge of the project, it seems, was to the administrators, since the kindergarten students used "invented spellings" (often without vowels) to communicate. At the same time, students at Murray High School in Albemarle County received a grant from the San Francisco-Moscow Teleport so that they could communicate with students and teachers in the Soviet Union. The participants in School 57 in Moscow were so excited by the new connection that they invited the American teacher, Becky Fisher, to visit the "electronic pen friends" during the summer of 1989.

A classroom in the Hanover, VA school system has been linked to the BitNet network via a node at Virginia Commonwealth University. BitNet nodes at Virginia Commonwealth University and the University of Virginia allow classrooms in Richmond and Charlottesville to communicate with one another. The pilot test was so successful that the Hanover school system has now linked all ten of its elementary schools to the network. Another classroom in Oberlin, Ohio, used a BitNet connection to correspond with "Soup," after their teacher attended a summer Logo institute at the Curry School and was introduced to some instructional applications of telecommunications. The students did so well with their electronic correspondence that the local newspaper featured their efforts as an example of "education for the future," and Robert Newton Peck, author of the Soup series, made them honorary members of the "Soup Fan Club."

BitNet is being used to form electronic communications partnerships between many classes in Virginia and student groups in remote locations. For example, in the spring of 1988, a fifth-grade class in Charlottesville, Virginia was paired with a class of native Alaskan children. During the semester the two classes exchanged scientific data and sociologic information. A field trip to Alaska is not feasible, but an on-going electronic conversation produces many of the same benefits.

Students can even communicate with famous historical figures, such as Rene Descartes and Thomas Jefferson. It seems that Mr. Jefferson (actually Educational History professor Jennings Wagoner), has become quite fascinated with the speed, efficiency and availability of electronic mail. He has put down his quill pen to answer questions via uploaded word-processed files from children in Ohio and Virginia who are studying about his life and work. His electronic letters are written, of course, in his precise, passionate, but eminently humble style.

> I am sorry that some of these electronic letters have arrived with errors. Some are no doubt my fault; after all, as fond as I am of new inventions, this word processing-electronic mail business is rather challenging and I haven't quite mastered it yet....Even so, what a marvelous way to communicate. In my day, mail could travel no faster than a horse could run or a ship could sail the seas. Now, within seconds, people around the world can communicate. It is simply amazing.

References

American Passages Series (1987). Thomas Jefferson's university. Charlottesville, VA: Thomasson-Grant, Inc.

Tinker, R. F. (1988). The StarNet project (proposal submitted to the U.S. Department of Education). Cambridge, MA: Technical Education Research Center.

INTEGRATING TELECOMMUNICATIONS INTO THE TOTAL LEARNING ENVIRONMENT: ONE INTERNATIONAL SCHOOL'S APPROACH TO USING TELECOMMUNICATIONS IN THE CLASSROOM AND ON CAMPUS TO FURTHER THE DEVELOPMENT AND USE OF EDUCATIONAL COMPUTING

Robert M. Hilgenfeld, Jakarta International School, INDONESIA

Planning for the next century is exciting. Implementing those plans is almost impossible! Never before has the future been so filled with the promise of vaporware (hard and soft). The prospect of new capabilities and technologies presents planners with age old dilemmas. Do we do this ... ? Do we do that ... ? What if we do ... ? What if we don't ...? How much will it cost if we do it ? How much will it cost if we don't ?

At Jakarta International School we have become acutely aware of the need for careful and thoughtful advance planning in our quest for the best possible education for our students. An education which incorporates the latest technology along with the academic skills necessary to cope with the workplace of the future.

Jakarta International School is the largest international school in the world, serving the educational trust of 2200 expatriate (K - 12) students and their families in Jakarta Indonesia. J.I.S. is a truly international setting in which students from 58 countries and teachers from 37 countries work together to build a truly international curriculum based on the American System of education.

Over the past few years J.I.S. has worked to develop a plan to incorporate telecommunications into the total curriculum or as we refer to it the total learning environment. Not only are classrooms from grades 4 - 12 taking advantage of the online access to the myriad of information sources world wide but also we have several student generated activities and programs which take advantage of the resources at J.I.S. It is our goal that student resources be used as extensively as possible to provide interest and ownership in projects such as the electronic student activities billboard computer program (Campus Crier) which was written in the International Baccalaureate Computer Studies Program and is now being used to make students and community aware of present and up-coming events on campus.

Where we are now

At present there are seven computer laboratories serving our students K-12. Each lab is equipped with approximately 24 computers and the associated peripheral devices such as printers, "mice" and telephone lines. The labs range from elementary labs in which computers are independent work stations to the secondary locations where Macintosh computers are linked in local area networks and provide the student with the convenience of their own private workstation coupled with the increased flexibility a network provides for access to other software, laser printing and network modems. Each classroom on the campus has access to at least one computer, as does each member of the faculty.

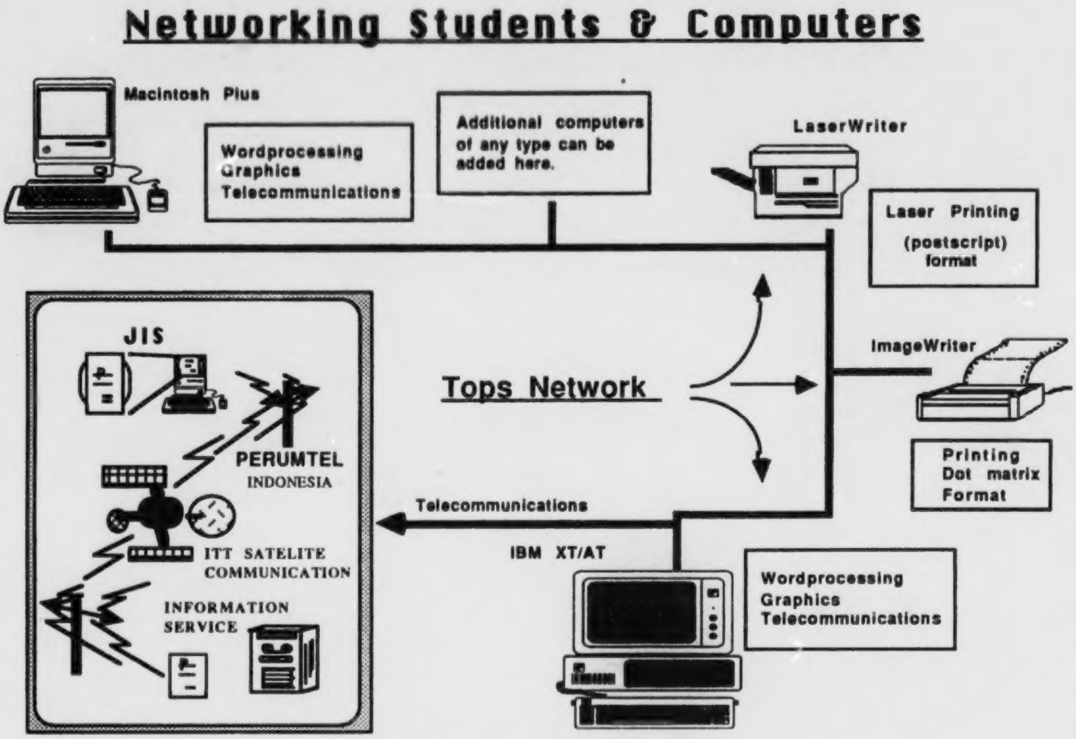

Networking Students & Computers
Macintosh Plus
Wordprocessing
Graphics
Telecommunications
Additional computers of any type can be added here.
LaserWriter
Laser Printing (postscript) format
JIS
Tops Network
ImageWriter
PERUMTEL
INDONESIA
Printing Dot matrix Format
Telecommunications
IBM XT/AT
ITT SATELITE COMMUNICATION
INFORMATION SERVICE
Wordprocessing
Graphics
Telecommunications

Figure 1.

Components of our Planning

Because of the physical size of our campus facility no discussion of telecommunications seems to take place without considering how it affects and how we can accommodate our local area network plans. Bringing telecommunications to the classroom becomes a larger planning issue than just the installation of a phone line in a classroom.

In bringing the promise of telecommunications to students and faculty several components must be addressed:

1. A hardware infrastructure must be in place.
2. Staff education in the concept of telecommunications and in the various types and quality of information services available must take place.
3. Staff training in the use of the equipment is necessary.
4. Staff development in curriculum application awareness must be an ongoing commitment.
5. Continued support for staff and students -- aiding them in the development of creative activities which test the potential of the telecommunications tool provides the necessary growth to keep programs and projects from stagnating.
6. Ongoing evaluation of the process at benchmarks along the way help to strengthen the program.

Network Planning for the Future

As Figure 1 suggests, the basis of our experimental design for the future depends upon the networked lab as a principal component. The capability for initial and ongoing instruction, in a group situation, allows for efficient and consistent training and enhances the value of shared resources which the network provides.

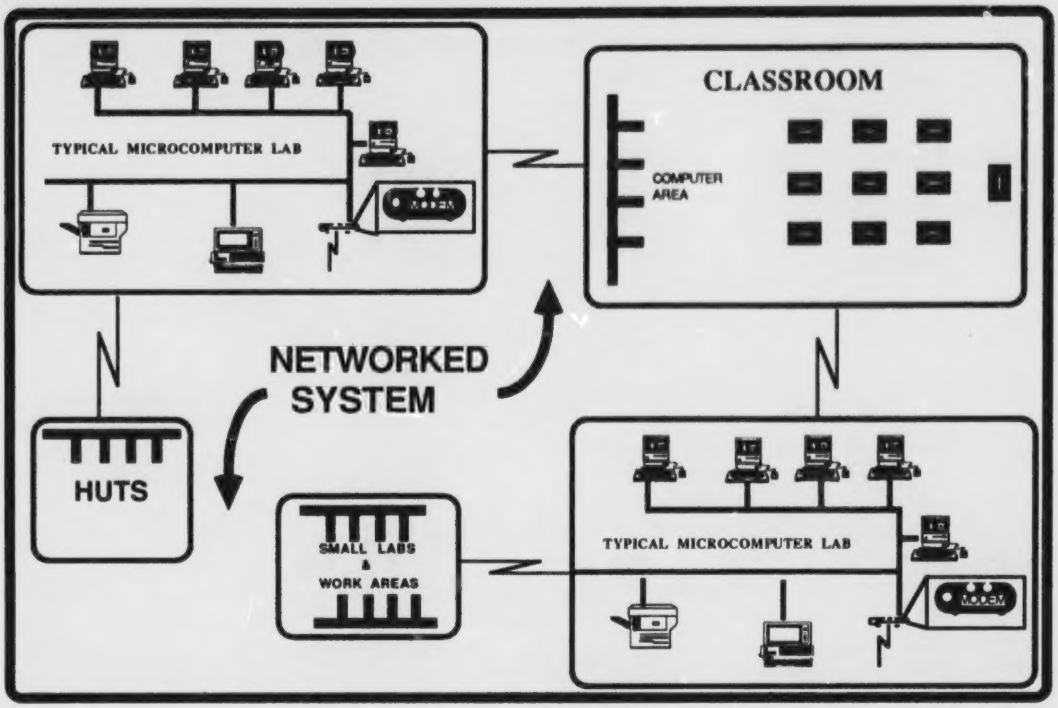


Figure 2.

The decision to network laboratories will allow us to continue to expand our capability by bridging one network to another (Figure 2.), allowing for ever increasing flexibility of student and faculty access to unique network devices which may not be available on every local network campus wide. The ultimate goal then would be to link not only the computer labs, the computers in classrooms, the special areas like the student study huts and the library facilities.

The networking of computers will increase everyone's ability to exchange information and display that information. The ability of students to access a broad range of information from their study hut, i.e. information on assignments from teachers, special study notes made available from departments, information about the week's activity schedule and access to the card catalog of the library, would be beneficial to all who are engaged in the processes of the learning environment.

In developing this kind of long range planning, one must also attend to the building blocks along the way which are necessary to enhance student, faculty, and administration awareness of the capabilities, limitations and possibilities the technology can provide. Once the concept, planning and implementation of the hardware component is in place, a school can then start to concentrate on the next phase of development.

SIP (Self Improvement Program)

Key to the success of a project of this magnitude is the extent to which staff is educated in the concept of telecommunications. Time for them to do guided studies, time for them to work and experiment in a one to one situation with a mentor, and time to work independently to gain confidence and to think about the applications which relate to this subject area are all necessary components if the program is to succeed. Staff training in the use of the equipment should parallel this phase and should be an on going part of the development (Figures 3 & 4).

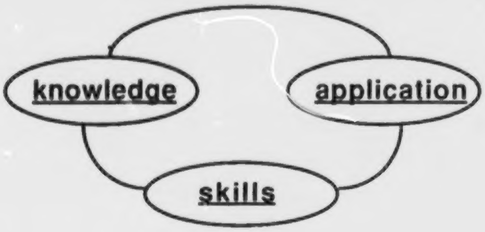


Figure 3.

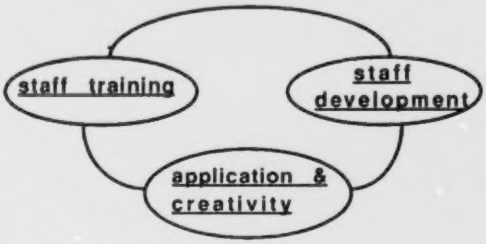


Figure 4.

Peer mentors are of major benefit to us at J.I.S.. We have an ongoing program called SIP (Self Improvement Program) which sets aside 90 minutes of the school day every two weeks for teachers to work on improving their skills through numerous group workshops and self directed study activities. One area that has been particularly well attended and also a topic which has been addressed by numerous individuals is the topic of computer use in all aspects of the educational environment. SIP time gives teachers the opportunity to explore a wide range of topics from hardware, to applications, to the integrating of computers in the curriculum.

The obvious outcome of the above program is to prepare our faculty for the necessary curricular application phase. In this dimension the department faculties are working with the computer coordinator exploring ideas which will lead to the development of activities which model techniques and simulate the type of data retrieval exercise one might encounter in real life in a particular curricular area. And to add to our commitment we will next year place our curriculum on line for use by the faculty to view, and modify as our curricular needs change. This provides a new and dynamic dimension. Our curriculum will be an online tool rather than just a passive document.

In curriculum awareness and integration we are concentrating at present on three levels of activity: (1) the International Baccalaureate Program, (2) the computer science courses which include computer applications and general survey at both the middle school and high school level, and (3) the academic areas, concentrating in science, social studies, and the study of English.

In science and social studies we are working on staff training in the information retrieval area using the large information services in the United States. Delphi, Dialog, Compuserve, The Source and others are being accessed. Examples such as the I.B. studies extended essay is a prime target for the use of these information services. Eric searches for students and faculty will be a project which will be undertaken through the library during the next school year. The English department will be starting a new program which will involve students electronically publishing their work on one of the information services. This exercise will give some of our students "world wide" exposure. Readers from many cultures and many points of view will be able to constructively comment on our student's work and in turn our students will be able to benefit from critiques from an international readership.

Student Involvement

We recognize that student involvement in the planning and implementation of the use of telecommunications and technology is vitally important to the success of our program. An example of cooperation in which a student project was implemented into a campus resource is the school's use of the student generated program "Campus Crier." This computer program was directed by a computer science faculty member and developed by several students. The objective was to develop a computer program which would display information on activities, calendar events and the like for the J.I.S. campus. The computer program allows for the entry of information and graphics and then implements the display in a cyclic fashion so that the information displayed continually cycles much as the information on arrival and departure flights does in airline terminals. A particularly strong feature of the program is that the cycling program can be edited and updated easily (much as you would in a normal word processor) and that previously designed graphics may be displayed at any time. This allows for the display of such things as maps of the campus buildings, or directions for the path which leads to a particular building or function. The program has operated this last year in a main student traffic area and will be expanded to 3 other sights on campus during the next school year. The possibilities for the expansion of this concept into the areas of "electronic publishing" for students has many interesting possibilities. "Advertisements" recruiting students for the track team by a coach. Pleas by student groups and classes selling items for fund raising, graphic announcements for the next dinner or school dance and the like are just a few examples. Many more are incubating. The computer club students will be operating a full time bulletin board which will serve as a "fish bowl" for the students of computer studies. They will examine and learn the functions of an electronic bulletin board from a system operators point of view. This activity will break ground for the day when our library card catalog will be available for students by modem, on and off campus.

The involvement of students in activities of this type provides the component of ownership which is so essential in any program which uses technology but concentrates its efforts on people. We feel that students should participate in an active as well as a passive manner. That is, students participate in a passive manner when they are involved in receiving information (computer accessed or not). They participate actively when the they become the "generators", and producers of the information.

Campus Publishing Center

Two years ago this author proposed an idea for a campus publications center located on the J.I.S. grounds. The facility would be responsible for "camera ready" copies of most of the publications produced on campus. Publications such as the J.I.S. newsletter to parents and community, student newspapers, and other pamphlets, brochures and hand bills would all be done at this facility. Now that center has become a reality and has been operating for a year. The center's networked Macintoshes, laser printer, file server, scanner and other devices are turning out professional quality documents. The potential for the center to add a telecommunication component is great. The possibilities for students to share information from their local schools and report news from their locations over telephone lines could add an entirely new dimension to the ever changing state of the art of communication. This next year J.I.S. will be looking for schools which would like to participate in an exchange of information of this type.

The Future

The future looks complicated, The future looks bright. The future looks busy. The networking of computers and their facilities has its advantages and its drawbacks. On the down side, computer viruses will continue to plague us as we swap, in a wholesale manner, more data and as we share more application resources. The complexity of connecting and maintaining networks adds a new dimension to our hardware, support, and maintenance systems. But, nothing is free. We pay our money and we are forced to take some chances. We cannot give guarantees to every decision we make. We have gained support through some credible decisions in the past. Our school council is willing to allow us to continue to experiment as long as we can show them that we are prudently striving for a better educational environment for our students. An environment which will contribute to helping the world grow smaller. An environment which will help facilitate communication among peoples.

The challenge of the next generation is to give purpose to that communication. Hopefully, the purpose is, through education and communication, to build a better world. One in which our students' children will have an even greater opportunity to live and learn and grow.

THE DAEDALUS PROJECT: WRITING AND TELECOMMUNICATIONS

Kathleen M. Hurley, IBM Educational Systems, USA
Chauncy N. Rucker, University of Connecticut, USA
Judith Sweeney & Thomas Roberts, Daedalus Project, Univ. of Connecticut, USA

The Daedalus Project developed a model for teaching writing skills to youngsters with disabilities using computers, modems, and electronic bulletin boards. What follows is an explanation of Phase I and Phase II of the Project along with specific procedures, accomplishments, and examples.

Daedalus was the legendary Greek craftsman who invented wings that allowed him to escape from the labyrinth in which he had been imprisoned. For centuries, Daedalus has been a source of inspiration for writers, and we offered him as a model to students with disabilities who hope to escape from their own prisons through modern technology such as computers and modems. The Daedalus Project, an activity of The University of Connecticut Special Education Center Technology Lab, is funded by the Connecticut State Department of Education, with additional support from Apple Computer, Inc.

Phase One

Procedures

The first phase of the Project was begun at Camp Hemlocks summer computer camp, during the summer of 1986. The Daedalus staff randomly selected twenty students, who were then randomly assigned either to the Mail Group or to the Modem Group.

These twenty students live all over the state of Connecticut, and ranged in age from 9 to 17 years old. At the inception of the project, they were in grade levels ranging from 4th to 10th, with two students in non-graded schools. They are fairly bright youngsters with physical disabilities: cerebral palsy, spina bifida, hydrocephalus, osteogenesis imperfecta, visual impairment, and artificial limb.

While this phase of the Project has been carefully chronicled in previous papers (Rucker, Roberts, & Gillung, 1987; Rucker & Sweeney, 1988; Rucker, Sweeney, & Reich, 1988), we would like to review several of its most important points in terms of procedure and accomplishments. The project teacher worked with the students on writing skills throughout the school year. Instruction in writing for both Mail and Modem Groups followed the first Daedalus Writing Curriculum, but the telecommunications hardware and software created certain differences. The Modem Group had to learn an additional set of skills. They had to understand the disk operating system (DOS); they had to be able to convert word processing files to ASCII, and they had to know how to send messages and to upload and download files from the bulletin board.

We found that students in the Modem Group were able to respond quickly with ideas, paragraphs, or stories. They would upload a story to the board one day, download the project teacher's suggestions the next, and upload their revision the third day. This same cycle could take up to three weeks for the Mail Group.

Additionally, the students in the Modem Group received immediate reinforcement for their messages and the assignments they uploaded to the board. Students and the project teacher were on the bulletin board daily, and they were able to ask questions or exchange ideas on an assignment at any time.

The volume of writing produced by the Modem Group was much greater than the Mail Group managed. On a single day, individual students in the Modem Group would leave as many as five messages on the board for the project teacher and for other students. The Modem Group not only completed more assignments and wrote more letters, but also communicated with each other. Our findings suggest that practice does make writers less imperfect and less hesitant to share their knowledge and feelings in writing. The Mail Group improved, but we think the Modem Group made even greater gains.

Mysterious Mel

The other major success from Phase I that we have also carried into Phase II is the inclusion of Mysterious Mel on the electronic bulletin board. Mel is a Special Education professor at the University of Connecticut with a great interest in youngsters using computers. He turned out to be a great motivation for the students. Use of the bulletin board went down whenever he was absent for any length of time.

To our great surprise, Mel played a large part in the unexpected social growth of many of the participants. Mysterious Mel is a complex character. He is always funny, positive, and supportive. Nothing seems to phase him. If a student said he thought Mel was ugly, Mel would thank him warmly and let him know that he was in fact the ugliest person on his planet. Mel encouraged creative thinking and decision making. Because he was from another planet (Alpha Paloozie), he was very naive in the ways of our world. For example, he would have to ask the students to explain words they used like "step-sister," "handicap," "dirty," "rank on," etc.

Mel also reinforced students for individual thinking. He encouraged them to let him know what they thought of various topics. He encouraged them to talk about their feelings. He showed them how to send secret personal messages so that he would be the only person who could read them.

Especially after Mysterious Mel joined us, we witnessed rapid social skill development on the board. We are continuing our study of this development. The electronic bulletin board gives us a view of how these youngsters develop and refine social skills. We know we've just scratched the surface here. What started as an experiment has proven to be a very valuable addition to the Daedalus Project.

Accomplishments

During its first year of operations, the Daedalus Project was more successful than we had expected. Three of its achievements deserve special attention. First was the Project's development of the Daedalus Writing Curriculum. Second was the development of an optimal service delivery model, a model schools can put to use in instituting a writing curriculum for all children with disabilities. Finally--and certainly not least--were the gains that the participants of both groups achieved.

A review of curricular materials revealed no single writing curriculum that (a) was appropriate for such a wide range of abilities, (b) employed a correspondence, or mentoring, model, (c) took into account the fact that the participants might have physical disabilities, and (d) incorporated the use of computers, word processing, modems, and electronic bulletin boards. We found ourselves by necessity writing a curriculum that was both uniquely suitable to these special conditions and in accord with conventional writing curricula. The first Daedalus Writing Curriculum provides an example for schools who wish to incorporate computer technology into the teaching of writing skills to youngsters with disabilities. In fact, the curriculum and optimal service delivery model could be used to teach writing to many other groups of youngsters and could also provide a basis for teaching other subject matter via modem and electronic bulletin boards.

Bluntly put: Phase I of the Daedalus Project has shown that if a school gives a fairly bright child with a physical disability a computer, instruction in keyboarding and word processing, and a structured approach to writing involving contacts with a teacher via the mail or a modem, that student will make significant progress. Our current work within a school system will help provide data about the effectiveness of these measures with children with other disabilities who are using the computer primarily in the school setting alone.

Having offered these reservations, let us describe two youngsters from Phase I who happen to have cerebral palsy, one from the Modem group, and one from the Mail group. These two examples of outstanding accomplishment in the project's first phase offer a tangible example of just what computers, word processing, and telecommunications can mean to the life of an individual with a physical disability.

Paul Dotts attends school in a segregated setting for youngsters with physical disabilities. He had never had a writing assignment -- because he couldn't hold a pencil. We gave him a computer, a modem, and some instruction and watched him bloom. Paul had relatives from Pennsylvania and was interested in learning more about the state. He was unable to go to the library to do research because he couldn't hold a book and turn the pages. However, with his computer and modem he was able to access CompuServe and from there, access information from Grolier's Electronic Encyclopedia and write an impressive paper on Pennsylvania. And he did it all with one finger!

Last spring we attended a team meeting at Paul Dott's school. We presented an overview of the progress Paul had made by having a computer with a modem at home. Paul is one of the most dramatic examples of what a child with a serious physical disability can accomplish by having the opportunities created by technology at home. As a result of this meeting, the school purchased an Apple IIgs with a hard disk for Paul to use at home. Even more exciting, the school is presently working to provide a transition for Paul back into the mainstream of his Oxford, Connecticut school.

Paul Hartleb's story is equally inspiring. Paul was in the mail group. He seemed preoccupied with a project at computer camp during the summer of 1987. It turned out that he was writing invitations to his relatives from the U.S. and Germany to come to a surprise 25th anniversary party for his parents in September. The party turned out to be a great success! The relatives did show up from both the U.S. and Germany, and Paul's gift to his parents was a family history he had written on his computer from the responses he received from all the relatives.

Paul has gone from not being able to write to becoming an author -- a prolific author. We've included below just the first two paragraphs of a three page story he wrote that was published in the Daedalus Newsletter. (He would want us to tell you that he actually had three stories published in the newsletter.)

> A Cowboy from Pluto
> by Paul Hartleb
>
> Riding in an ice ox round-up on Pluto is certainly not the average guy's idea of fun, but then again, I was never your average type of guy. You can't be too average to come out and try to settle the last Great Frontier, Space. Pluto is probably the most desolate of all the frontier areas in the universe. To give you an example of how desolate Pluto is, the total population is just 500 people. That is a rather small number of people compared with the latest population figure from Jupiter. Jupiter has a population of 15,940 people. I am the type of guy who likes adventure of the unknown lands. On Pluto, the sun is a little more than a softly glowing ball, and the sky is always black with an endless amount of stars and comets.

I am a big man here on Pluto in the year 3590. One thing I really like is riding my turbo charged plorse. For you Earthlings, a plorse is a high powered rocket that is shaped like a horse. The one good thing about these plorses is all you do is give them gas once a year, and they last the year through. You all come along and I will get your heart beat sky high.

This young man had been in a medical facility for years, but entered the "mainstream" of Newington High School in September, 1987. In the spring of 1988 we attended a team meeting that was called to plan Paul's IEP for his senior year. What a positive experience! Paul and his parents were in attendance, and you could tell from the interactions with the faculty that Paul had become a very popular student. Paul had done very well in a challenging set of high school courses, and he was able to keep up with his homework because of the computer he had at home. The plans for the 1988-89 school year include even more rigorous courses. Each of the teachers and the principal had become advocates for Paul. The school agreed to let Paul use an Apple IIe from the Special Education Department this year at home.

The last topic of the meeting was brought up rather hesitantly by Paul's mother. She asked, "Do you think Paul could go to college?" Not only did the staff think he could, but the counselor agreed to work with Paul to help him select an appropriate college. Paul will be entering Central Connecticut State University in September of 1989.

While success with students like these two would have made the Daedalus Project complete at the end of Phase I, there were many more successes and problems to tackle in Phase II of the project.

Phase Two

During the second year of the Daedalus Project we continued to work with the original group from Camp Hemlocks, but we also entered a new phase. In reality, the adjustments we had to make in the project for this phase have almost turned the project into two separate projects. Phase II of the Daedalus Project is school based. In addition, Phase II students represent a much broader variety of handicapping conditions including both learning and emotional difficulties. Finally, the students in Phase II of the project have access to the project computers, software, and modems primarily in the classroom setting, and students must share computer, modem and printer time with each other. These differences have presented some difficulties as well as some major advantages in terms of both implementation and instruction.

The school version of the Daedalus Project, or Phase II as we call it, was begun in March, 1988, in three middle school resource rooms in Willimantic, Connecticut. We installed an Apple IIe computer system in each of the three rooms. The systems included the Apple IIe with 128k of memory, a printer, a modem, and a variety of software which included a word processing program (Bank Street Writer III), a modem program (Modem Manager), and an adapted version of a public domain brainstorming program (Mind Mapper). The project teacher spent one hour per week in each classroom, and the classroom teachers reinforced and added to concepts between visits.

The organization and scope of the writing curriculum was the first major change in this phase of the project. With the advantage of dealing with a group of students in one setting on a one to one basis, we soon found that a good deal more instruction could take place, and we could depend on peer interactions and teacher reinforcement of lessons much more consistently. However, from the first day in the classroom, we realized that the Daedalus Writing Curriculum designed for the first phase of the project would have to be rewritten to meet the needs of both the teachers and students in the second phase.

The resulting work on the curriculum which is now being put into finished form is the second version of the Daedalus Writing Curriculum. Recognizing the special needs of many students in special education in terms of instruction and success in written communication, the curriculum shares our successes with a variety of computer programs, activities, and especially telecommunications possibilities. This new curriculum addresses special considerations that teachers must make in the special education writing classroom to assess, evaluate, and help all of their students gain mastery in the written language. The key to this success in writing is the motivational capabilities of computer technology. When we place kids in front of computers with modems and electronic bulletin boards, wonderful things start to happen. Writing reluctance disappears; kids are proud of their work; editing and revision become easy and desirable; feelings are shared; written work gets longer; and kids actually say that they like to write!

This classroom approach borrows much from current theories on writing process and conferencing, but in all areas we use the computer and teleconferencing as motivational and reinforcing tools. For example, as our students develop strategies for prewriting, we have them use the adapted public domain program Mind Mapper. Given a target word, the student is directed to type in 10 related words as fast as he can think of them. Only the time between responses is measured. The student's primary goal is to get this time score as low as possible. The secondary goal, though, is far more applicable to special education. Later in the day the student looks through the list of ten words he typed in response to the target word. We then ask him to judge which words really focus on the topic suggested by the target word. Beginning self ratings were extremely low (in the area of 20-40% focus on topic), but with practice and discussion with teachers during pre-writing conferences, we have seen amazing growth in this area.

Brian is an example of growth in this area. Brian is part of the small, self-contained class for students with behavioral disabilities at Kramer Middle School. In addition to community and home related problems, Brian reads well below his grade level and has difficulties with all academic subjects. As would be expected, these repeated failures have caused Brian to develop a sophisticated set of negative defenses to the introduction of anything new. When the Daedalus Project was first introduced, Brian went into the corner and turned his back on us...until we started to actually physically install the computer. When we purposely had trouble reaching a plug, Brian came over to help -- and never left the computer again. Brian immediately latched on to the Mind Mapper program. Within the first several weeks, he had earned enough free time to run over thirty target words. He would pour over his lists and look for ideas that really focused on the target. At first, he considered himself lucky if 2 or 3 out of 10 words were really connected to the target word, but as the weeks passed, we often saw that more than 50 or 60% of his choices showed good focus and connection. This constant practice on his own time accomplished two very important things early in the project. Brian got to "know" the keyboard and become quite comfortable with his own style of four finger and a thumb entry, and Brian no longer panicked when we asked him to write. Practice in brainstorming eased the anxiety when writing time came. While his content remained at a fairly low level, Brian was writing comfortably -- a major advance for only a few months of instruction.

Another major success involved the use of the word processing program and printer. As you might expect, a good number of the students showed severe difficulties with their handwriting. Filled with wonderfully imaginative ideas, they often chose to not hand in required written work rather than risk the embarrassment of having the teacher continually return to ask them what something said. The ability to print out their work and see readable, neat results was an early positive reinforcement for continued writing for many of these students. The actual choice of word processing programs, though, has presented some problems. Because of student familiarity with the programs we decided to use Bank Street Writer III, a ProDos based Apple program that many of you are using all across the country. One very important feature of Bank Street Writer was the ability to insert words by simply moving the cursor to the point of insertion. Without exception, students in these special education classes wrote short, unadorned sentences and relied on prosodic devices (such as capital letters for emphasis, underlining, different size letters, overuse of exclamation points, etc.) for emphasis rather than full, rich vocabulary. Much instructional and practice time was spent in building more interesting sentences by using this insertion capability.

This highly positive characteristic, though, was overshadowed by two negative features of the program which we addressed during the third year of the project. Bank Street Writer III, like many other programs used in schools, is not a "what you see is what you get" program. Because of the use of an on-screen return character and word wrap, many of our students were extremely disappointed when their work printed out differently than it appeared on screen. It became increasingly obvious that finished product was of primary importance to them. The second major problem involved the use of the spell checker and the spelling problems of some of our students with learning disabilities. In reality, these spell checkers are not designed to find or help with the kinds of problems these student writers face. In the vast majority of cases, the spelling checker had no idea what the student was even trying to spell.

Several students come to mind when we consider the self-esteem gained through the ability to print out their ideas rather than struggling with handwriting. Even when they had to work through several print outs to get what they wanted and even though the spelling checker was not entirely useful, these students were extremely proud of what they had to say and the fact that it could stand alone. Scott comes to mind almost immediately. Scott is in a learning disabilities language arts class in the project, and his teacher considers him to be quite bright, but Scott's handwriting is unreadable. He is embarrassed by it, and over the years he has developed a series of strategies to avoid any writing. His handwriting is extremely light, doesn't stay on the lines, contains few curves or proper spaces, and consists of letters that are almost unrecognizable. But Scott has a rich and fertile imagination, and he reads science fiction constantly. He wants to share his ideas and feelings, and now with a printer he is just beginning to really experiment with his creative potential.

As instruction progressed, word processing instruction led us into the use of telecommunications. We wanted the students to feel comfortable with the keyboard and writing before we actually taught them how to use their modems and communicate with the Daedalus Electronic Bulletin Board maintained at the University of Connecticut. To introduce the idea of telecommunications and what it could mean for them now and in the future, we wrote a workbook entitled Telecommunications: Talking to the World with Computers. Written on a 5.5 grade level with a variety of activities, the workbook has been extremely successful in introducing the concepts of telecommunications to students. By the time they logged on to the bulletin board for the first time, they knew what to expect and how to word process messages for the project teacher, Mysterious Mel, and each other.

The motivational impact of telecommunications continued to prove itself during this phase. For those educators who already accept the motivational aspect of computers alone, telecommunications will prove to be the next even more motivating step. The ability to leave messages, to say what you want, to laugh and be silly one minute, and to talk about deep and serious subjects the next minute, make telecommunications a vital aspect of the technology based writing program. Within one week of the beginning of telecommunicating, we were forced into scheduling times, so that everyone could have an equal chance, and we simply could not give students the time they really wanted on the computers. There was no chance that the computers in these rooms would be gathering dust; they rarely cooled off!

Several students began using computers wherever and whenever they could find them, and they simply wrote and wrote, and then wrote some more. Again several students come to mind in this regard. Leo, a quite, serious young man from a large, tightly knit Hispanic family, said little during classroom lessons or conferences. You can imagine our surprise, then, when we happened to be next to him one day while he was saving a paragraph on his data disk. The screen was full of several columns of file names all created in the previous two months! Leo, taking advantage of every spare moment he could, had over 30 files in which he had simply written whatever had come to mind. Most were private, but one, the longest piece of writing he had ever produced, helped us really begin to know him. In writing about professional wrestling, we began to really see Leo, and Mysterious Mel (a wrestling aficionado himself) quickly found a new friend and ally.

Most students didn't write as much as Leo; but for some, one completed composition was as much an accomplishment. Adam, a gifted student with severe learning disabilities, had never finished a composition. He could be forced in the classroom to start one, but he had never completed one. With encouragement provided by Mind Mapper, print outs of his word processing, the conferencing and writing process philosophies, and a real love for sending and receiving messages, Adam actually completed several compositions for the first time. Now one of our most active board users, he helps others and is showing increasingly more positive attitudes about his school work.

The electronic bulletin board continued also to be an extremely reliable device for the use and reinforcement of successful social skills and real self-discovery. Mysterious Mel was on the board when students first logged on, and he very rapidly zeroed in on those students who had the most immediate need to talk about their problems and fears. In addition, one teacher used the board with one of her most disruptive behavior students. Because he was highly motivated by the board and picked up the terminology and procedures readily, she used him as a peer tutor for those students who needed extra help. She reported that Tony's total classroom behavior and outlook improved not just during the time he was helping others but also throughout the entire school day. Instead of ranking on his classmates, Tony had found a positive way to communicate with them.

Finally, we noticed that the students weren't the only ones using the board to work through and vent feelings. In fact, the first use of the board for venting of feelings in Phase II came from one of the teachers in the project. Because of the high pressure demands from students, administrators, and parents, the three classroom teachers often used the board during their lunch breaks or after school to get things off their chests and to encourage each other. While we had not anticipated this use of the electronic bulletin board, we were not surprised by it, and we now actively encourage it.

During the third year of the Daedalus Project, the three classrooms at Kramer Middle School were joined by a middle school class at Mansfield Middle School in Mansfield, Connecticut, and a middle school class at Squadron Line School in Simsbury, Connecticut. These classes represent a variety of socioeconomic groups, disabilities, and areas within the state, and all the participants are eager to learn and share with each other.

During year three we switched to a new window based word processor called Multiscribe. Multiscribe is a "what you see is what you get " program. Whatever the students composed on the screen would look the same when it was printed out. In addition, Multiscribe makes available quite a collection of different fonts. Students could pick a font that matched the mood of their writing. Some picked a particular font that no one else used and wrote everything using that font. The fonts were very motivating and led to a greater sense of ownership of their writing.

In addition to the interschool communications, the project has also been able to secure an arrangement for study with a new commercial telecommunications service called Prodigy. Prodigy is a graphics based service with pictures and forty column display. Supported almost completely by paid advertisers, Prodigy is part of the future of telecommunications. It is attractive, easy to use, and full service. Besides being able to contact each other in the message section of the board, teachers and students who use Prodigy are able to access national and regional news stories, weather, sports, on-line games, quizzes and contests, and ask questions of famous people and places. Since Prodigy runs exclusively on MS DOS computers, IBM provided PC's to the Daedalus Project for use in each of the classrooms.

The youngsters in the Daedalus Project have explored many sections of Prodigy. They have played Where in the World is Carmen San Diego? For math practice, they have shopped for airline tickets from American Airlines and groceries from Kroger's in Atlanta, GA. They have followed a condensed classic story, reading a new chapter each week. Our preliminary data indicate that the students spend time on Prodigy engaged in language arts (45%), science (15%), free time (15%), math (12%), reading (9%), and social studies (4%).

Prodigy also helps us address one of the major impediments to implementation of telecommunications in the classroom. Because of their corporate background and sponsorship, Prodigy is able to offer the service for a flat fee of $9.95 per month -- a fee well within most school budgets. During year three, our work with Prodigy has helped determine how to best serve education and refine their rate structures.

We are refining, publishing, and disseminating the products and results of three years of work with Daedalus. The telecommunications workbook has been revised for use in any classroom which wants to introduce telecommunications, and the new edition of the Daedalus Writing Curriculum promises to make an impact on the instruction of written communication skills using technologies' most attractive features. Finally, as we worked with the classrooms in Willimantic, Mansfield, and Simsbury, we have developed the expertise so that we can help local school districts choose, set up, and run their own electronic bulletin boards for nothing more than the cost of the phone lines and the bulletin board software.

More than we had ever dreamed possible, we are committed to the possibilities and advantages of telecommunications for the lives of individuals with disabilities. Their communication with us and with each other is just the beginning. The whole world lies before them. The Daedalus Project has merely provided their wings.

References

Rucker, C. N., Roberts, T. J., & Gillung, T. B. (1987, October). Writing and social skills enhancement via modem: The Daedalus Project. Paper presented at The Closing the Gap Microcomputer Technology in Special Education and Rehabilitation Conference, Minneapolis, MN.

Rucker, C. N., & Sweeney, J. (1988, February). Communication on electronic wings: The Daedalus Project. Paper presented at Technology Advancing your Profession, sponsored by the American Speech-Language-Hearing Foundation Conference, Mesa, AZ.

Rucker, C. N., Sweeney, J., & Reich, M. (1988, April). The Daedalus Project: A statewide electronic communication system for improving the writing skills of youngsters with disabilities. Paper presented at the National Symposium on Information Technology, Charleston, SC.

Author Notes

Chauncy N. Rucker, Ph.D. is Director of the University of Connecticut Special Education Center Technology Lab and Professor of Educational Psychology; Kathleen M. Hurley is Education Industry Consultant, U.S. Marketing & Services, IBM Educational Systems, Atlanta, Georgia; Judith P. Sweeney, B.S. is Daedalus Project Coordinator; and Thomas J. Roberts, Ph.D. is writing consultant to the Daedalus Project and Professor of English at the University of Connecticut. For further information contact the senior author at The University of Connecticut Special Education Center Technology Lab, 249 Glenbrook Road, U-64, Storrs, Connecticut 06269-2064, (203)486-0165.

GOING ON LINE: A MAGNETIC HIGH SCHOOL EXPERIENCE

Erica K. Lodish, Montgomery Blair High School, U.S.A.

> 'This is a very valuable research tool. I was able to research several topics in less than a quarter of the time it has normally taken.'

> 'The librarians at the public library were happy to use my printout to help me find articles.'

> 'Even though some of the things are hard to locate I still get more titles that I can find mixed in my search than I could find the old way.'

> 'I wish there was more full text.'

These are some reactions of students at Montgomery Blair Senior High School in Silver Spring, Maryland to online database retrieval. This research tool, formerly available in special and academic libraries and in some public libraries, is now being incorporated into the high school media skills curriculum. The students use microcomputers and modems to hook into vast warehouses of information which they can search for answers to their research questions. 'Accessing these warehouses (electronic databases) is one of the fastest-growing trends of high school telecommunications computing in the United States today.'[1] Understanding the role of information growth in society, selecting research topics, and learning how to carry out traditional research projects are all information retrieval skills which are introduced and reinforced from elementary school through high school. Their place in the school library media program has already been firmly secured. Developing an awareness of online searching is the newest element in the curriculum.

Online information retreival has been available to professionals and students from Maryland's Montgomery County Public Schools' professional library Teachers, students and administrators have been able to go to this library and after a reference interview and search by the librarian they receive offline prints to assist in research projects.

In 1982 twenty two high schools began the process of going online. The rationale was comprehensive. In this era of the information explosion it became apparant that students would need to expand the resources available to them. One of the goals and priorities of the Montgomery County Board of Education is to adjust "the instructional program to better provide graduates with the knowledge and skills they will need to adapt to a rapidly changing world."[2] Online searching is one way to facilitate this goal.

After careful study and planning, hardware (Apple II+, Hayes Micromodem), software(Data Capture 4.0) and online service(DIALOG) were chosen. After a series of workshops and introductory sessions DIALOG's Classroom Instruction Program(CIP) was on its way to a beginning in MCPS. Many support efforts have been and are continuing to be provided . Media specialists met and added computer literacy objectives to the MCPS document Instructional Objectives for Information Retreival and Media Production. A brochure was written and distributed called "Computerized Database Searching in Your Media Center." An inservice course was offered to professionals on online database instruction. Students from Springbrook High School developed a manual for using DIALOG.[3]

Since its introduction DIALOG instruction has grown from being a tool for finding additional reference sources to an active part of the curriculum enhancing many subject areas. The media specialists in MCPS are committed to incorporating online instruction along with other media skills as a major part of the total curriculum. The use of DIALOG either by virtue of its newness or its appropriateness has been a motivator and strengthener for cooperative planning between media specialists and teachers.

Montgomery Blair Senior High School in Silver Spring Maryland is one of the schools participating in this program. It is an urban/suburban school near the border of Washington D.C. Its diverse enrollment hovers near 2,100 students with a racial mix of 61%

minority and 39% majority and 45% mobility rate. Students come from approximately 59 countries and 37 languages can be heard in the halls. Because of its wide range of needs many special programs are offered at Blair including ESOL(English for Speakers of Other Languages) and SPARC(Special Education, Alternative and Remedial Classes).

Three media specialists operate Blair's school library. They have divided responsibilities for media skills instruction by academic departments. "The primary purpose for teaching online bibliographic searching was(is) to introduce students to a library service that would enable them to perform research more expeditiously and provide them with relevant information..."[4] Online instruction is part of all curriculum areas. Introduction to and integration of online into the curriculum varies according to need. It is an objective to introduce online databases to all students at Blair as an alternate source of information by the end of tenth grade. *The Reader's Guide to Periodical Literature* taught to the ninth grade prepares students for exposure to online in the tenth grade. Certain classes in the major departments have been selected as targets for instruction in online. They are: Oral Communications, U.S.History II and Contemporary Issues. These courses were selected because all students take these classes and they have a curriculum that allows for a variety of topics. Classes which focus on introduction to online receive instruction in terminology, the process of going online, the types of information that can be retreived, use and application of Boolean operators, basic commands, planning a search using the search request form and making an appointment for an interview/search. Sometimes teachers require students to attach the printout of their search to their research activities.

Aside from introductory lessons many units in selected classes contain more indepth instruction in online database retrieval. In these cases online research becomes an integral part of the curriculum. These units are of three major varieties:

1. Units which analyze data especially statistical and demographic information.
2. Units which evaluate a wide range of opinions or reports on controversial topics and individuals.
3. Units where summaries of current research are needed.

With these units students receive instruction on specific features of databases including uses of prefixes and suffixes, author searches, use of search guides, how to carry a search from one database to another and using descriptors to expand or narrow a search. Time, willingness of the teacher, size of class and nature of the final assignment help to dtermine if students will go online independently or in pairs with active coaching from the media specialist. Some classes and groups which have had correlating activities have been Biology, Physics and General Lab Science (in preparation for scence fair projects), the debate team, Contemporary Issues, Comparative Literature and Psychology.

In 1985 a Science/Mathematics/Computer Science Magnet Program was estabished at Montgomery Blair. This program offers an accelerated and integrated curriculum for highly able students. Instruction in online database retreival is an important part of their curriculum. Beacause of this new hardware and software (four Leading Edge Computers, Hayes compatable modems, Crosstalk Software) were purchased and three more phone lines were installed to implement the program.

One of the purposes of teaching magnet students how to use online databases is to prepare them for a required independent advanced research project during their senior year. Dr. Michael Haney, director of the magnet program, says, "The program couldn't function without it (online service). It is crucial for the students to be able to find the materials that they need. Many of these resources couldn't possibly be housed in any high school." Magnet students will need to use the public, professional, technical or university libraries available in the Washington D.C. area right from the start.

Students in the Magnet program are introduced to online database searching in the ninth grade in their computer science class. This is done during a unit on applications software. A week long session begins with an introduction to DIALOG, equipment, vocabulary, commands, Boolean operators and search strategy. They are further introduced to the database catalog, search request form and how to narrow their topic into concepts. The students are scheduled in pairs to attempt a search independently. Because of the integrated approach to their curriculum Boolean logic is also a component of their geometry class. The topics they are using for their online search are for a project in their research & experimentation course. The project may vary in content from year to year. In 1985 and 1986 the students planned and executed searches for background research for their participation in NSTA's and NASA's Space Shuttle Involvement Project (now called Space Science Involvement Project).

The ninth graders next formal exposure to DIALOG is in support of their Chemistry research project. This unit is especially frustrating because most of the chemistry databases on DIALOG are not available on the CIP. Students find BIOSIS, Magazine Index, SciSearch and Medline to be helpful. Students are encouraged to attach printouts of searches to their research papers.

In the 10th grade online instruction in the magnet program becomes more intensive because in the 11th grade the students will have to select and define the topic for their senior year research project. In the first semester of their sophmore year students are reintroduced to database retrieval to support an Earth Science project. The project assignment is to design a space probe to investigate the location of their choice in the universe. Students use Magazine Index, SPIN, INSPEC, and Aerospace Database.

Students are introduced to DIALOG at Blair H.S. in a number of ways. When possible entire classes can see demonstrations online in the magnet computer science classroom where there is a computer with modem and an Electrohome Projection Monitor. When this is not possible students receive an overview lecture/discussion sometimes supplemented by a video tape or slide presentation. Next they will be divided into two groups. Half of the class will do traditional research in the media center, supervised by their teacher, while the other half goes into the media center's computer laboratory to see a small group demonstration. Individual or pairs of students then rotate online independently while the rest of the class continues to work in the media center. Students who want to go online for other individual assignments are encouraged to pick up search request forms and schedule time for a search interview and online time with one of the three media specialists during lunch, study hall, or after school.

Most students adapt to searching techniques easily. They are required to fill out a search request form and to write up a search strategy before going online independently. If they are online with the media specialist as intermediary they need to fill out the request form, go through a short interview and sit with the media specialist who will explain the procedure and results to the student. Online databases are not provided as a service but are intended for instruction!

Students, teachers and media specialists have all benefited from online searching in the curriculum. The experience has brought a lot of enthusiasm. Phillip Gainous, principal of Blair H.S., says, "The few students I've talked to are excited about online research. It will become more widespread as the students become more familiar with its use. This will revolutionize the use of libraries for them. It's mind boggling." Students are often surprised at the results of a search. Those that accomplish the skill of going online as independent end-users receive a good amount of self confidence and satisfaction. Many students have volunteered to be intermediaries for other students needing help during peak load times in the media center.

Aside from the advantages of speed of retreival, accuracy of results and currency of information, students also receive academic benefits. Online searching provides students with a place to reinforce research and thinking skills in another medium. In the area of research students learn the importance of and the skill of narrowing down a topic. They become aware of the variety of resources available to them ranging from common information sources such as popular magazines, newspapers and encyclopedias, to uncommon sources such as technical reports, corporate financial directories, and international symposia. They must also take initiative in their learning process by going out of their school library to use other libraries in the community. They learn the value of long range planning in order to obtain resources. Online searching is also the perfect exercise for students to apply higher order thinking skills. When they define a problem, break it into its parts and design a search they use problem solving and logical thinking skills.

At Blair, school library media specialists and classroom teachers work together planning online searching instruction. Teacher support has made an impact in the planning and success of the program making it possible for online and the whole library research process to be intertwined with the total assignment and delivery of the curriculum. The teachers and the media specialist work in a team effort to deliver the integrated curriculum each taking the responsibility for their areas of expertice but each reinforcing the importance of the other.

Some of the positive trends that have been a direct result of the online program can be seen in the increased use over the past four years. The usage can also be reflected in the changes in the school's periodical holdings. New subscriptions have been added due to frequent requests from students needing references from search printouts. "The overall use of a wide variety of materials" shows that "students are diversifying their approach to information seeking."[5]

Montgomery Blair Senior High School has continued in its pioneering spirit by participating in the implementation of a project in the use of CD-ROM in MCPS. In the spring of 1987 the first phase of the project began with five IBM compatabile computers with hard disk drives, five Hitachi CD-ROM readers, and selected software. Some of the CD-ROM disks that are being used for review and evaluation are: McGraw Hill Encyclopedia of Science and Technology, Wilson's Reader's Guide to Periodical Literature, Grollier's Electronic Encyclopedia, NewsBank Index, and Facts on File. Another exciting part of this project is the introduction of a PAC(Public Access Catalog) Disk created through The Library Corporation's BiblioFile Catalog Production System. The compilation of this online catalog disk is part of a co-operative project between other school systems and libraries in Maryland. We hope that, through the PAC Disk, library materials will become accessable to all for resource sharing. The idea is to start at the grass roots level and then to branch out. Participation in innovative projects of this variety is just another way to help students adapt to the Information Age.

REFERENCES

1. Lodish, Erica K. and Anne S. Caputo. "ReSEARCHING Online: Schools and Electronic Databases." THE COMPUTING TEACHER, May/June 1986.

2. Montgomery County Public Schools Board of Education, BOARD OF EDUCATION AND MCPS PRIORITIES. Adopted by the Board of Education September 13,1983.

3. Pruitt, Ellen and Karen Dowling. "Searching for Current Information Online... How High School Library Media Centers in Montgomery County Maryland are Solving an Information Problem by Using DIALOG." ONLINE, Vol. 9 (2), March, 1985, pp47-60.

4. Craver, Kathleen W. "Teaching Online Bibliographic Searching to High School Students." TOP OF THE NEWS, Vol. 4 (2), 1985, pp. 131-138.

5. Wozny, Lucy Anne. "Online Bibliographic Searching And Student Use of Innovative Teaching Approach." SCHOOL LIBRARY MEDIA QUARTERLY, Vol. 11 (1). Fall 1982, pp. 35-42.

INTERSCHOOLS COMMUNICATION

Nina Lund, Fredensborg Schole, DENMARK

INTRODUCTION

Ladies and gentlemen. It is a great pleasure for me to have the opportunity to present to you some of the pedagogical projects we are running in Denmark which are supported by advanced technology.

In my lecture I am going to discuss a number of pedagogical activities, but before we come to that, I would like to spend a few minutes presenting the pedagogical environment we are operating in.

Here you see a picture of DLH - Danmarks Lærerhøjskole - or The Royal Danish School of Educational Studies. That is the institution that has been responsible for most of the projects I am going to cover.

Next you have Fredensborg School. That is the school where I am teaching, and that is one of the places where we have gained practical experience from the projects.

Schools in Denmark are characterized by the fact that although we have a curriculum the content of and the methods applied in education are very much decided by the teachers. This is an important difference to schools in most other countries.

It means that ideas coming up in the interaction among teachers, students, parents and others can be carried out in the school, if the teacher judges it valid. You don't need to wait to work with new ideas until they are officially accepted by some higher authority.

In cooperation with DLH, we have had a lot of freedom to test different ideas for exploring the computer environment in the education.

Another unusual feature of The Danish School is what we call "the unified school system".

It means that teachers are educated to cover the whole range of topics from first to tenth grade. As you can imagine, that requires a lot of continuing education of the teachers - and that is the main purpose of DLH.

It also means that a teacher can follow a class from first grade to tenth grade. In the projects with DLH this has worked in such a way that we could continue development work with our classes for more than just one year.

The DLH project.

Now let me introduce to you the DLH project.

The DLH project is a joint project among The Royal Danish School of Educational Studies, IBM Danmark A/S and about 15 Danish primary and secondary schools. In brief - the objective is to obtain knowledge on how informatics will influence The School.

The DLH project started about 4 years ago as the "INFA" project. At the end of 1986 DLH and IBM decided to extend the project by establishing network connection among all the project schools.

This technical extension of the project is called DLH-EARN as we are using the European Academic Research Network - EARN - in our communication.

Later on a whole set of new research projects has been established based on the network technology that is now available.

As the project has been running for 4 years now, a lot of results and experience has already been achieved.

Let me try to summarize from my own experience:

One of the most striking observations is that the students demand higher quality from their own work. It would be a research project in itself to give a thorough explanation of this statement. But just to illustrate this, I hear comments from my students like: "When we write in Danish to our friends on Iceland, it has to be correct. We don't want them to learn wrong things from us."

Another observation is that the students seem to be more openminded to what happens outside the school. We have got many new contacts and the students also seem to develop a better international understanding.

Let me also mention that the electronic mail has created a boom in written communication. This may not be a surprise to you, but in The Danish School we usually give priority to the spoken communication.

We have also seen many new ways of working together, among classes, students, teachers and parents. Since all these activities can't be controlled in details by the teacher, I have seen the role of the teachers changing towards being a consultant.

PEDAGOGICAL PROJECTS SUPPORTED BY ELECTRONIC NETWORK COMMUNICATION.

Next we will discuss some of our pedagogical projects in more details. We have activities directed to teachers and other directed to students.

Let me start with an example of a project directed to teachers.

DISTANT EDUCATION FOR TEACHERS IN MATHEMATICS.

INFA LEARN Background:

The Royal Danish School of Educational Studies has during 25 years offered continuing education for Math teachers through letter courses. A course has consisted of 6 to 10 course letters and each letter has contained work material for 4 to 6 weeks.

This type of courses has especially been used by teachers on Greenland, but due to the weather conditions at winter where mail service is irregular, those courses have only partly been carried through.

The cooperation between DLH and IBM Danmark made it possible to realize the ideas of a new type of distant education.

In the INFA LEARN project pedagogues and computer experts worked together and thereby established a distant education system, which makes use of the electronic network.

INFA LEARN Functions:

The main aim of INFA LEARN is to illustrate how far it's possible to go by this simple distant education system only.

It is therefore not dependent on audio and video, but only on the transfer of information that can take place using the equipment that all the network participants have - an ordinary PC.

The philosophy of the project is that learning is best obtained in a well prepared educational situation that comprises the student's self activity and an outside inspiration, motivation and evaluation.

INFA LEARN Perspectives:

The INFA LEARN project is continuing in 1989. The aim is to include more subjects, more topics and more levels. Furthermore - if the necessary economic support is available - it is the intention to develop electronic distant courses for the general adult education.

The distant education project has to be seen in a proper perspective.

In tomorrow's society one must expect that the majority of adults will require access to continuing education in order to adjust and to bring their professional and working qualifications up to date. An electronic distant education might be part of the answer to this.

The INFA LEARN project has tried the possibilities in establishing such a distant education for one part of the labour market - namely the teachers in primary and secondary schools.

This project will no doubt result in experiences which can be used in general continuing education for adults.

COMMUNICATION PROJECTS FOR STUDENTS.

Now I want to turn the focus to some of the many activities which we are running with our students that make use of communication by means of electronic mail.

But before we look into our projects in detail I want to make a point, which I consider very important and a guide for all our communication activities.

The point is that communication across borders may provide our students with knowledge of social life and culture in other countries and that may lead to cross-country respect and friendship based on mutual understanding. In other words:

we want the students to make friends through understanding.

I have chosen four projects that reflect different pedagogical aspects in the use of electronic communication and I will try shortly to present the main points of each.

Communication to schools in other countries.

The first project I want to discuss with you is the communication with foreign countries. In the DLH-project we have tried to communicate with six different countries. I will take our communication with England and Iceland as examples.

Communication with Iceland and England

Let us see how it was started up and how we use the network.

It seems to me that such projects always are initiated by some individuals who have pedagogical visions and also have close contact to the decision makers. In our case it happened that way.

The main reason is probably that these projects require equipment and network connection that a school can hardly afford - at least that was the case when we started. Now the situation may be different because the prices have gone down a lot since then.

Our communication projects have been different from other projects in at least one way. We didn't have personal meetings with our communication partners, and because of that a new set of problems which we hadn't imagined popped up.

So we started the communication with our contact schools without really knowing who we were going to work with.

Experts in network communication always talk about different layers of communication and of communication protocols. Based on our experience, I think it is also very important to agree on a communication protocol at the teacher-to-teacher level when you are running a communication project. That is a common acceptance of things like:

- the pedagogical content of the communication
- the results you expect
- the level of quality
- how much time you accept to spend on the project
- the maximum number of days elapsed before you answer a message

Above the teacher-to-teacher level, you could even imagine a human-to-human level that may be important to the success of the communication. As a consequence I would recommend that the teachers involved if possible should be given an opportunity of personally discussing their expectations before they start a communication.

I would also point out that the support received - both technically and pedagogically - has been crucial for the success of our projects.

In Denmark we have been favoured by the support received from the DLH project, and we have seen how quickly and efficiently we have established communication to schools in Iceland because of the way IBM Iceland has supported the schools.

At Fredensborg School we made this "INFA-magazine" with the purpose of presenting our school to our communication partners.

The magazine is prepared by our students and contains information about our school, the local environment and the students themselves. Copies of the magazine will be on view after the lecture.

The students - helped by some teachers - also made a video showing our school, the surroundings, and the day-to-day life of some of the students - like: going to school, having meals, going out at night, and so on.

Communication with handicapped students

The next network project is also concerned with understanding through communication. Here the cross-border communication is not to another country but to a group of citizens that has different conditions of life in another way. I am talking about the blind or the visually impaired people.

In this project my students have worked out descriptions of how they imagine the life of a blind person, like: how to do things like walking around, dressing, cooking, playing games, learning things etc.

These descriptions are then sent via the network to the blind students and since the information is represented electronically, it is possible for the blind students to read it by means of some computer devices specially made for the blind. This is due to another joint project among The National Institute for Blind, DLH and IBM Denmark.

As you see, this would not have been possible if my students had written letters, since the blind then would need somebody to help them read the contents.

After having processed these descriptions from my students, the blind students will respond back and tell my students how they feel about the matters discussed.

I have spoken about our blind citizens because we have worked together with them, but we could as well have worked with other groups of disabled citizens.

These groups are characterized by the fact that they usually live very isolated from other people and they have few opportunities to communicate with people outside their own group.

I think that our project has added something to their lives as well as it has given my students a good experience.

Distant education from DLH - "American culture"

And now I want to show you another use of the network where many schools during the same time work with one teacher.

The teacher is an American visiting professor - an expert in American culture - whom many schools wanted to make use of.

The project started in one of my classes - a 10'th grade - the age of the students is about 17. In this exercise my students could ask questions about The U.S. and professor Eric Sandeen answered. I have an extract of this communication.

As this test was a success we got the idea to expand the project to other schools and classes that could benefit from professor Eric Sandeen's valuable knowledge.

So in the next phase of the project the order of question/answers has been reversed. Now Professor Eric Sandeen is asking questions to the participating classes and they answer.

As professor Eric Sandeen's wife Sue is working on her thesis on attitudes to U.S. and American culture, all the classes will benefit from communicating with experts in this field.

When the classes have answered the questions which both concern facts and attitudes, Professor Eric Sandeen and his wife will consolidate the material and send their conclusions back to the participating classes.

The project is running now and more than 20 classes with students aged from 13 to 20 are participating.

During the project phase in which the classes work with the questions we have the possibility af asking questions of Eric Sandeen.

DATA COMMUNICATIONS - A MEANS TO AN END

William Newman, Sadadeen Secondary School, AUSTRALIA

"Is it really 2 days to the nearest city?" the mail message read.

"Only if you drive 10 hours a day" was the reply.

The English teacher who despatched the original message was amazed at the casual approach to such geographical isolation, but for the teachers and students of Sadadeen Secondary College it is an accepted part of life. Sadadeen is a place that offers students of Alice Springs in the Northern Territory, Australia, the opportunity to complete their final two years of secondary education without traveling to the city.

For the students, there is no exposure to other ability levels or lifestyles; for the staff, professional interaction is limited. From this comes a desire to be in the forefront of education, a desire to know what is happening in other places and a commitment by staff to ensure the students are not disadvantaged.

Sadadeen is concerned with preparing the individual for society. One of the ways this is achieved is through a unique project involving computers and data communications.

Computing at Sadadeen is high profile. It is non-compulsory but with a 90% computer literate staff, most students are exposed to the technology in some form or another at some point in their education.

The same English teacher who asked the original question also commented on how lucky we were to have such excellent computing facilities. The College is equipped with two computer laboratories of 20 machines each, to help prepare our students for the future computer society. Such a view is shared by many people and computers indeed have a large role to play in education.

At Sadadeen we are very conscious of the way people view our use of computers and the associated technology. The "computer society" term is a strange one. It is I believe as valid a term as is "the camel society" that could be used to describe society for the early pioneers of Central Australia or "the train society" for the people of London. What does it mean? Such terms, given the time scale of human existence are, to use a cliche, nothing more than "a stage we are going through".

Our society has a large dependence on computers and the silicon technology but there is a danger. It lies in the attitude "we have a computer society, therefore our prime concern is to train our students for the use of the technology in that society." This may be valid but is only one small component of our technological world. The preparation for a "computer society" is far more involved than simply learning to use or even understand the inanimate objects within it.

How we actually prepare our students for this world is always a matter of concern and in some cases controversy. The project at Sadadeen focuses on using data communications to achieve a far broader learning experience. Many schools partake in data communications of different sorts, what makes Sadadeen different is that the aim of the involvement is to give students a learning experience not possible in the rigors of the traditional school structure. It's more than just using the technology.

The one thing that will never stop regardless of the technology is the desire and need to learn. To learn not just the technological skills but the social skills. A joke once told to me went something like this "Any fool can argue with the facts, but it takes intelligence to have an opinion." What this means to the staff and students is that the sheer mechanics and use of the technology is not enough, what we must do is promote and develop the social and personal skills that our students are going to need in a technology based "computer society".

What has all this philosophising got to do with data communications I hear some ask? To the mechanics or the science of it absolutely nothing, but to the users in schools everything. The education systems of this world all set out to impart to their students skills or knowledge they will need when they leave school. Before I explain how Sadadeen ties in this preparation for society and data communications ponder this;

> "Electronic mail, both personal and business, could replace a large portion of our conventional paper mail and shrink delivery time from days to minutes. Educational systems could be available to students anywhere. The remote buying and selling of everything from shoes to automobiles would be possible in the vast market place that the technology would create. This market would have other novel characteristics. It might operate through reverse advertising - you describe the kind of car you want, the price you want to pay and the amount of backseat leg room you want the manufacturers then display on the screen only those products that meet your criteria."[1]

If the above description were to be a large scale reality think of the social consequences. The comments were made by Mr Michael L. Dertouzos, Director of the Massachusetts Institute of Technology Laboratory for computer science. He makes such comments not based on fantasy but on current research. Is data communication potentially that significant and if it is what is happening in education about it? If it is true we must prepare our students for this future world, not just the mechanics but the human elements of it.

Data communications in education has come a long way in the last 5 years. It is still however going through the "but what do I do with it" phase. Comparisons can be drawn between the usage/acceptance of data communications and computer usage/acceptance in schools in the early 1980's. These comparisons can be made for both implementation and attitudes. People see society making use of the technology and believe that every student who leaves school must understand it and be able to use it. The problem with this attitude is it is lacking in real substance.

---

[1] Trends in Computing, special issue/vol.1. 1988. New York: Scientific American Inc.

What unfortunately is missing are the human skills which the students need to survive in a world that requires not only new personal skills, but the refinement of so many others. Skills that as young people we didn't need to have as refined as the students of tomorrow will need. The virtues of responsibility, patience and above all initiative may well be pre-requisites to survival in the world of tomorrow. It is true in the past they were needed, but needed to succeed; we are talking here about needing them to survive.

The question is no longer whether or not computers have a place in education but more a matter of what they should (as opposed to could) be used for. They are a tool, no more, no less. They are however like no other tool man has created. It is the use of the tool that determines it's long term value. Learning how to use it is only part of the solution. Schools must come to terms with not only the possible uses of them, but how as a tool they can develop human skills.

To live in both the current world and more significantly a future world does not, nor will it, require an indepth understanding of the technology. What is required is an insight into how to use it, and more importantly how to accept or reject it. We cannot produce sheep who believe, trust and totally depend on the technology. We must produce people who are informed, responsible and capable of accepting the responsibilities of their own actions. All societies must consist of individuals who have an appreciation of their own self worth. The product of our education systems must be people who can use the technology but not worship it, people who will not blindly accept that all technology is beneficial and will know how best to use what is available.

Such a task is daunting. The current education systems have difficulty coming to grips with the technology let alone preparing students to cope with the very different world it is creating. At Sadadeen a project has been established to achieve this task. The thrust of the project is to develop in students not just the skills of data communication usage but the skills of a future world.

At Sadadeen, data communications is used to achieve the "human element". It exposes the students to the technology and gives them the opportunity to determine for themselves it's possible uses. As well as this, and in fact the underlying emphasis, is to develop in the students the social skills and refine their own personal qualities to help them survive in "the real world".

It is the students who organise, run and make all the decisions concerning the use of data communication at Sadadeen Secondary College. It is they who decide what messages will be sent, who checks the mail, how and when the password is changed.

They are responsible for monitoring the overall cost and making contact with teaching staff regarding ideas and the general dissemination of information. The students have complete control.

The students' involvement in the project begins during third term of the College year and they complete their involvement at the end of third term the following year. This means there is a five or six week overlap where one group is "doing their apprenticeship" and the other is finishing up. What we have is an on-going project where in part the students themselves take responsibility for the training of other students.

For the new students it is a very demanding time with lunch time theory lessons on communications and tasks given to do virtually overnight, as well as preparing for their exams. The pressure is deliberately placed on them to sort out those who are genuinely keen and prepared to stick with it and those who are just along for the ride. The point to make here is that the project is open to all students who are interested. As a result the groups are not necessarily made up of the academic high flyers of the College. In fact the majority of students involved in the project have been students who struggle through their final year. In many cases it has been the project that has broadened their outlook and refined the skills they have needed to pass.

From a teaching point of view the most outstanding aspect of the project is the students' commitment. Despite having end of year exams the students still come in to check the mail and keep regular contact with our twin schools in England and Japan. The College year finishes at the end of November for the students and does not begin again until the end of January. Knowing the break for schools in other parts of the world is not as long, the students make arrangements for access to the College during this period to maintain the contact. They are the only group of students the Principal allows to work in the College unsupervised. Often this group of students are the only ones in the building and must take responsibility for locking up as they leave.

This may seem a rather large responsibility to place on 16/17 year olds but it is one that they have relished. The group completely run the system in a democratic way with no one student more or less important than any other. In a moment I will deal with what the students think of the project, but first, let me outline some of the tasks and achievements of the group since it's conception in late 1987.

In April 1988 the first group had the very prestigious honour of presenting a paper at the first International Computer Pals Conference. The students prepared their paper and presented it with a professional air that would have made any presenter proud. To highlight this and to explain the involvement of the students in the project let me use their own work. The following is an extract from the paper the students presented.

> "The Sadadeen Data Communications Team deals mainly with the daily checking of the system and the co-ordination of both the incoming and

> outgoing electronic mail. The students in the team are not involved with the writing or compilation of the actual correspondence. They instead have the weighty responsibilities of maintaining the actual system, documentation and distribution of all incoming and outgoing mail.
>
> The team is also involved in the co-ordination of all major events using data communications, such as Newspaper Days, combined schools quiz night and the correspondence between the different school bodies of the two schools, eg. Maths and Science Clubs."[1]

The important point to make here is that the team of students involved in the project try to involve the rest of the College community in some form or another. Their responsibility is not just to themselves, it is far more diverse.

Apart from their various media presentations, conference, quiz night, newspaper days, and general dissemination of information the first group of students went on an educational tour of the United Kingdom in late 1988. Throughout the one month tour they spoke to students and educators on data communications and their role within this unique project. Again the quality of their presentations and insight was far in advance of their years and a testimony to the success of the project.

In order to maintain this project successfully, the personal strengths and virtues of patience, responsibility and initiative must be developed in the students. This is what the project is all about. It is what makes it significantly different to all others. Data communications is a vehicle to a destination - a means to an end.

As far as the students themselves are concerned there is one word above all others that is used, responsibility. The students believe it is the giving of responsibility, rather than the enforcing of it, that has made the project work and given them the greatest satisfaction. The following is a series of quotes extracted from the students' final individual reports. They submit reports to highlight both positive and negative aspects of the project and their involvement in it.

"The idea of taking responsibility and being able to make our own decisions was appealing."

"This year has gone extremely fast and an incredible amount has been done even though it has not been exactly what we originally set out to do. What we have achieved by far outweighs what we have not and I am far from disappointed with the results."

---

[1] Kim Mason et al. (1988) A Students Perspective.
Paper from the Computer Pals Across the World Conference.
Sharing in a global classroom p37.

"Even though the project in my mind initially was to learn about data communications it turned out to be an unusual lesson in business."

"The responsibility made it."

"I didn't believe I was capable of learning so much, and I'm not just talking computers."

As educationalist we all have ideas on what the education system should be doing. Unfortunately what we would like, and what happens are not always one and the same. It is too easy in this fast pace world to lose sight of what educating the individual is about. It is equally difficult to convince people that computers and the associated technology are, on close analysis, only a very small part of that education, as important as it may be.

Data communications has provided a means of letting us develop the human aspects of education. Development not possible by the traditional means of education and not possible through the technology alone. Data communications has the ability to enthuse students to the point where they want to be responsible for their own learning, and that is what real education is all about.

The gains of such an approach to not only data communications but to education generally are tremendous. This project in using data communications has stamped itself as different. Different not in the things it does but in the way it does them. The students involved have benefited greatly and it is only fitting they have the final say.

> "The project has been, and we are sure it will continue to be, a great success. As well as benefiting Sadadeen Secondary College as a whole, the project has given the Data Communications Team members great personal satisfaction. We consider it an honour and privilege to have been involved in this project."[1]

References

Sharing in a Global Classroom, Edited Ralph Czerniejewski, Official papers presented to Computer Pals Across the World Conference 1988.

The Times Network Systems Handbook, 1988/89, London.

Trends in Computing, Scientific American, special issue/vol.1.

---

[1] Kim Mason et al. (1988) A Students Perspective.
Paper from the Computer Pals Across the World Conference.
Sharing in a global classroom p37.

NASA DISTANCE LEARNING PROJECTS FOR EDUCATION

William D. Nixon, NASA, U.S.A.

INTRODUCTION

One of the key elements of the mission of NASA Educational Affairs Division is to disseminate in an educational format NASA's activities in research and exploration and the results of these activities to the educational community. Since NASA is a high-tech agency, it has assumed a leadership role in the educational technology movement in education and through its Educational Technology Branch has initiated programs utilizing modern technology to expand its delivery system to students and teachers.

This paper will discuss and demonstrate two effective distance learning projects now conducted by NASA Educational Affairs; NASA Satellite Videoconferencing for Education, and Spacelink, which is a computerized information access system for educators.

SATELLITE VIDEOCONFERENCING

BACKGROUND

NASA has been a leader in the development of communication satellites for more than thirty years, through an evolutionary development period from a huge gas inflated balloon (Echo 1) in 1960 that reflected radio signals from orbit; to low orbiting active repeater satellites (Relay), 1962, that received and transmitted to a receiving site and provided the first satellite link between the United States and Europe; to the first successful geosynchronous orbiting satellite (Satcom 2) in 1963 located 22,300 miles (36,000 Kilometers) above the earth and was the first operational communication satellite. Today more than 120 geostationary communication satellites are found in orbit near the equator forming the foundation for a multibillion dollar communication industry that has changed the world.

The first communication satellites to be utilized for education were launched as part of NASA's Application Technology Satellite Program. Launched in 1974, ATS-6 delivered education and public health programming to Alaska, Appalachia, Canada and India. The satellite's powerful transponder made it possible for isolated communities to receive the programming with relatively inexpensive equipment. Experiments in educational programming continued with the Communications Technology Satellite (CTS) launched in January, 1976. A joint venture with Canada provided two way audio and visual satellite links for town meetings and conferences.

As a service to the educational and scientific community NASA made programming available by satellite during the Voyager encounters with Jupiter in 1979 and Saturn in 1981. Planetaria, science centers and universities were notified and provided a television schedule. Those participating in this project observed images as they were returned from the spacecraft to the Jet Propulsion Laboratory and received presentations on these images from NASA scientists and principal investigators involved.

In April, 1985, as a pilot project, NASA Educational Affairs arranged satellite programming for elementary and secondary schools during the Space Shuttle 51-D mission. Satellite Communications for Learning (SCOLA), an organization of universities and elementary and secondary schools with downlink capabilities, coordinated the school participants. The project, titled "Mission Watch", was initiated with an interactive videoconference produced at the Kennedy Space Center one day before launch. Several scientists with experiments aboard discussed their projects and answered call-in questions from students and teachers. A highlight of these presentations was the "Toys in Space." Students observed physics concepts on earth as the toys were demonstrated and two days later observed the same demonstrations live from the space shuttle in orbit. An evaluation of this project was valuable for later satellite videoconferencing.

Satellite videoconferencing with elementary and secondary schools was to play a large part in the Teacher-in-Space (51L) mission. Classroom Earth, an organization of elementary and secondary school satellite users coordinated the school effort. PBS was scheduled to carry two live lessons from space. The backup Teacher-in-Space candidate, Barbara Morgan, was designated as host and would give a 15-minute program and interact daily with Christa McAuliffe the teacher in orbit. Two overview videoconference programs were conducted from the Johnson Space Center and Kennedy Space Center one day before the accident. Classroom Earth estimated that two million students and teachers observed these programs.

TECHNICAL FACTORS

NASA's educational videoconference series "Update for Teachers" is produced by the Oklahoma State University Telecommunications Center in Stillwater, Oklahoma. This Center is experienced in satellite videoconferencing, having produced and distributed by satellite, specific programming for the State of Oklahoma. The Center has full television production capabilities including an uplink and downlink for satellite distribution. The Telecommunications Center was recently awarded a Star Schools grant from the U.S. Department of Education to expand videoconferencing in a five state area including Kansas, Missouri, Mississippi and Alabama. A ground-based antenna uplinks television signals to the Westar 4 satellite located in geostationary orbit at 99 degrees West Longitude. Most school satellite reception dishes are pointed toward this particular communication satellite.

NASA maintains its own Television Release System (referred to as NASA Select) used to provide immediate access to information for all NASA's regional centers. Several NASA Centers also have the capability to produce and transmit programs to other Centers by satellite. NASA operational requirements take priority on NASA Select television system during mission periods. During non-mission periods programming of interest such as press conference, briefings, and aerospace related educational programming are broadcast, as well as imagery transmitted from unmanned spacecraft. NASA Select programming is transmitted live via domestic satellite. C-Band transmissions are uplinked from the NASA Center originating programming to RCA's Satcom F2R. Transponder 13 is currently assigned for NASA transmissions. Satcom F2R is located at 72 degrees west longitude over the equator. It's transmission frequency is 3960 MHZ. All satellite transmissions are in the public domain and available to users with the capability to receive C-Band satellite signals.

The format and distribution of NASA's educational videoconference for teachers requires the use of two satellites and two or more production centers. The Oklahoma State Telecommunications Center is the major production center and inserts are produced at the NASA Center or Centers featured in a particular videoconference. These inserts are uplinked to the Satcom F2R Satellite, downlinked at Oklahoma State, processed through the switcher and uplinked to Westar 4. During the interactive portion of the videoconference, teachers phone in questions collect to the Oklahoma Studio which transmits the audio to Westar 4 for broadcast across the country. The questioning teacher's voice is picked up from Westar 4 at the NASA site so the speaker is able to hear the question with less than one-half a second delay from the moment it is spoken. Answers to the questions are sent back by F2R to Oklahoma where they are relayed to the viewing sites via Westar 4.

Hundreds of schools across the country downlink the live interactive programs with small home style satellite reception dishes often called TVRO's or television receive only antenna, 8-15 feet in diameter. On many occasions assistance has been provided schools in downlinking programs by commercial cable companies and educational television stations. State satellite networks such as Missouri, Oklahoma, and Louisiana have promoted and provided downlinks for schools over large areas.

FORMAT AND CONTENT

NASA Educational Affairs initiated a videoconference series "Update for Teachers" in 1987 for the purpose of expanding its delivery system to elementary and secondary teachers. After a pilot effort it was decided that four programs would be offered during the school year. They would be one hour in length, interactive and contain the following components:

Content - Each program would contain a visual presentation on a NASA mission, activity or phase of aerospace research.

This presentation would be made by a NASA scientist or engineer.

Education - This portion would contain demonstrations of activities, experiments and strategies for the classroom. These demonstrations will be related to the content presentation and be presented by a NASA educator.

Interaction - Teachers offered the opportunity to question each presenter.

Feature NASA Center - Content presentation would originate from one or more NASA Centers.

Classroom Resources Teachers would be informed of available materials and programs for their classroom.

During the 1987-88 school year the following satellite videoconference programs were broadcast:

October 8, 1987 - HUBBLE SPACE TELESCOPE

A systems engineer from the Goddard Space Flight Center explained the expected capabilities of the Hubble Space Telescope scheduled for launch on a future space shuttle mission. Planetary activities were presented in the educational segment.

November 19, 1987 - SHUTTLE FLIGHT STATUS

Rick Hauck, Commander of STS-26 Space Shuttle, described astronaut training activities of his crew prior to the STS-26 flight. Activities related to human factors in space flight were presented in the educational segment.

February 25, 1988 - SPACE STATION

Associate Administrator for Space Station gave a tour of the Space Station mock-up from the Marshall Space Flight Center. Educational segment featured designing a classroom space station.

May 5, 1988 - LAUNCH VEHICLE PREPARATION

From the Kennedy Space Center, the Shuttle Test Conductor discussed processing, testing and preparing the shuttle for flight. Principles of rocketry were featured in the educational segment.

The 1988-89 school year included the following satellite videoconference programs:

September 28, 1988 - AERONAUTCS

From the Langley Research Center, NASA's role in aeronautics was featured. Flight activities were demonstrated in the educational segment.

November 15, 1988 - LIVING IN SPACE

Topics included space suits and space food. The challenge of living in space was discussed from the Johnson Space Center. Classroom activities related to living in the space environment were presented in the educational segment.

January 24, 1989 - FUTURE EXPLORATION

NASA's concepts and plans for long range goals in space were outlined. The NASA Lewis Research Center was featured. The educational segment featured basic principles of space flight.

March 21, 1989 - TECHNOLOGY FOR YOUR CLASSROOM

A visual presentation on the Numerical Aerodynamics Simulator (Super Computer) was featured from the Ames Research Center. The educational component featured demonstrations related to classroom technology (computer, optical discs, distant learning).

At least two weeks prior to each program a package of material is mailed to each registered site coordinator. This package contains program related publications, copies of classroom activities and an information sheet on tuning the satellite and how to interact with the program. Special segments have been added to the programs when appropriate to updating teachers on NASA activities. For example - joining the Kennedy Space Center for launch status and science briefings. Highlights from current missions have been popular with teachers. Videotape segments for the classroom have been uplinked for school videotaping after the program close. This demonstrates great promise in distributing materials quickly to teachers.

EVALUATION

Numbers of schools and participants viewing each program is difficult to estimate accurately in educational satellite videoconferencing for the following reasons: (1) You only have feedback from those that have registered. The Series is promoted widely with satellite tuning information and many view the programs without bothering to register. (2) A high percentage of the sites tape the program due to difference in time zones and teacher release time. These tapes are viewed several times sometimes by many different schools for staff development programs. There are several counties, regions and states with centers that downlink and provide the program to several schools in their area by a closed circuit television. (3) Teachers from several schools sometimes attend workshops that feature NASA satellite programs. (4) Several commercial cable systems provide this series as a service to schools in their area. (5) Many teachers invite students to observe the live program.

The Technology Branch of NASA Educational Affairs maintains an accurate database of registered viewing sites. A site could be a one-room elementary school in Alaska with a receiving dish or a state satellite network such as Missouri. It could use a cable feed of many schools, as in Ohio, or a PBS station, as in Los Angeles, CA, or Norfolk, VA. For our first satellite videoconference teacher program on October 8, 1987, we registered 166 sites and that has grown to 535 sites for the last program March 21, 1989. We estimate this to represent approximately 2,000 schools and 20,000 teachers that view each videoconference live or by videotape.

A participant survey was conducted after the 1987-88 NASA "Update for Teachers" satellite videoconference series. Following are some of the important results of this survey:

Grade Level of Teachers Viewing Videoconference

Secondary	66%
Elementary	22%
All Levels	8%
College	3%
Other	1%

How Did Participants View Conference

Tape	58%
Live	42%

What is Preferred Time for Videoconference

2:30 Eastern	27% (highest percentage)

How Was the Videoconference Received at Schools

School-Owned Receiving Dish	60%
Parent or Teacher Tapes at Home	14%
Borrowed or Rented Receiving Dish	12%
Another School Tapes	7%
Cable Assistance	6%
PBS System	2%

What Segment of Videoconference is Most Important?

(1 = Most Important, 5 = Least Important)

Information on Current NASA Projects	1.9
Educational Activities for the Classroom	2.2
Receiving Educational Materials	3.0
Announcement of Educational Programs	3.6
Ability to Interact with Presenters	4.0

Highest Percent Negative Aspect

Program format should include a longer period of time for interaction.

Highest Percent Positive Aspect

Ability to receive current information from NASA

FUTURE

New satellite research, such as NASA's Advanced Communication Satellite (ACTS) scheduled for launch in the early 1990's could enhance satellite communication for schools in the future. This satellite will explore Ka-band frequencies which are about twice as high as frequencies in use today. Ground station dishes will be vastly smaller and receiving equipment probably cheaper. Education related experiments are scheduled for this payload. Advanced video system technology for possible use on Space Station Freedom is also under study by NASA.

NASA Educational Affairs has found interactive satellite videoconferencing to be effective in communicating with large numbers of teachers and plans to continue to expand and improve this concept.

Plans are underway to conduct a live lesson from space. Several astronauts have expressed interest in participating in this project. The basic concept would be a short lesson taught live from the Space Shuttle while in orbit, and selected students would have the opportunity to interact with the Space Shuttle from their classroom. The Hubble Space Telescope scheduled for launch in early 1990 is a target possibility.

The Mission Watch concept will be revived for the Teacher-in-Space mission not yet manifested but probably launched in the early 1990's. This will include live lessons taught from space, science activities demonstrated during orbit, and interaction by students with the teacher in space. Update programs will be given on a daily basis as students and teachers follow the entire mission from beginning to end. This project will be made available to students on a worldwide basis.

The Space Station Freedom scheduled for completion in orbit in 1996 will offer education outstanding opportunities. A continuous classroom in the sky where experiments, demonstrations and activities conducted in the space environment aboard Space Station Freedom would be compared to those conducted in real time in the Earth environment of the classroom. Educational activities would be developed at all educational levels. Students and teachers would be able to interact with those aboard the Space Station. A detailed plan for this project will be developed by Educational Affairs for Space Station approval.

NASA SPACELINK

NASA Spacelink is an informational access system developed to serve educators. The system is a 24-hour computer information database that allows educators quick access to information related to aeronautics and space research that is both current and relevant to their classrooms.

Spacelink is managed by the NASA Marshall Space Flight Center, Huntsville, Alabama, for NASA's Educational Affairs Division. It is a dynamic system that is updated daily. The system is menu-driven and user friendly so that someone with little computer experience can put it to full use.

Spacelink features current NASA News Releases, information on developments in aviation and space research, Space Shuttle launch schedules, future and historical program information, announcements of educational projects and research, classroom materials and lesson plans for classroom use.

To communicate with Spacelink an educator needs a microcomputer, modem, communications software and a long distance telephone line. A printer is optional. The service is free but the user is responsible for long distance calls. The system has a main memory of 14 megabytes and disc storage space for 708 megabytes. It can communicate with 12 callers simultaneously at 300, 1200 or 2400 baud.

To access Spacelink, use your computer communications software to call the following number: 205/895-0028. First time users will be asked to register for the service and to choose a personal code for future communications. The NASA Spacelink Main Menu is divided into (1) log off Spacelink, (2) Spacelink overview, (3) Current NASA news, (4) Aeronautics, (5) Space exploration before Shuttle, (6) Space exploration beyond Shuttle, (7) NASA and its Centers, (8) NASA Educational Services, (9) Classroom Materials, and (10) Space Program Spinoffs. Several topics with sub-menus will be demonstrated during the presentation. When you log off the system you may leave a message for NASA. If the message requires a response it will be done with regular mail or a note which will appear next time you log on.

TELECOMMUNICATIONS IN EDUCATION
IN DEVELOPING COUNTRIES

Jaime Prilusky, Centro de Inv. Cient. y Tecnol., Mendoza, ARGENTINA
Address today: Weizmann Institute, ISRAEL

As the responsible for the decisions taken by the Ministry of Education of Mendoza, Argentina, related to the introduction of computers in education, I faced different problems. Being a developing country with many limitations and restrictions, It seems interesting to share our considerations which may benefit other countries in a similar situation.

What is a developing country ?

I am sure that there are more than one definitions of what a developing country is supposed to be. However, Argentina as a developing country is a place who knows what to do but do not have the means to do it.
We are convinced that computers will allow our students to get a more personalized education. We understand that telecommunications means to allow the child to view the world as a big country, where every human being has similar feelings, fears and problems. We are sure that students with such experiences will understand better in their near future people from other countries.
We know what we want to do, but we do not have the means to do it. What we needed was to be able to get the computer power without computers !.

Computer power without computers.

The main idea was that the really important thing is to know how to use information rather to be able to remember a lot of it.
We found a french word, informatique, who describes a field related with computer science.
informatique: an automatic and clever way to manipulate information.

That is, a work done in cooperation between a computer and a human. The analysis of this definition shows that the computer should be responsible for the automatic manipulation of information, but it is left to the human being the responsibility for taken the decisions of the clever part of the work. How the data should be combined to get the most out of it is a human work.

Six months ago, I published a paper about the subject (Navegando el mar de la informacion, o como hacer informatica sin computadora) and I began a movement trying to show the possibility of getting at least half of the benefits of the computer work without having computers.

Such statement can be understood by taking into consideration the fact that just having a Data Base is not enough in order to be able of getting the most from it. It is necessary to know how to combine the data and how to place meaningful questions. In that paper I proposed several exercises to be performed by the students, in order to learn how to manipulate data. To develop their capacity to interconnect facts and to be ready for the time when the computers finally gets to our schools.

A couple of months later, two schools found the way. The works done by the students where interesting and showed that one can work cleverly with information without having computers. Today, many other teachers are following the same way. They are working with their students in a different way. They are managing information without a data base and proving that the really important thing is to know how to use information rather than memorizing it.

The goal was accomplished. Our students are in their way to the computer world without computers. They are getting ready themselves for the day when the schools gets the dreamed computers.

The next step was to try to accomplish the same task toward telecommunication. We needed to answer a couple of questions.

What is the essence of telecommunication ?. What can be done of the general work of telecommunication without telecommunication ?.

It was no so easy as with the general computer science.

It is true that interchanging of information can be accomplished trough the mail, and drawing dots on a map may show the students that they are just part of something called humanity. However, we are loosing an important portion: the interactivity. The feeling of knowing that there is another people, like ourselves, with similar interests and problems, which is at that very same instant sharing our thoughts.

The figures.

It is time to consider the problem of introducing telecommunications within the frame of the general ecomomic position of a developing country.

As a general rule, the international market is far away from the prices that ruled the internal movement of a developing country. In our country, the effective buying power changes continuously, many times in relation to the marketing alternatives of the rest of the world. However, it is most usual to have a low buying power than a high one.

When it comes the time to decide how much money should be applied to salaries, buildings maintenance, education improvements, there are so many factors involved that technology usually gets the last place. And the people which takes the decisions have no lack of information.

The justification for such decision are clear: the relative cost of the variables involved.

For example, a good school teacher earns a salary of 100 dollars a month, and may climb to 150 if she/he has been working in the same job for 15/20 years.

On the other side, a low cost personal computer in our country sells for about 1500 dollars (without hard disk or printer, of course). That is the amount of money that a teacher earns in a full working year !!. This fact explains why are there so few public schools with computers in our country, and why the private schools are buying really cheap home computers in order to have a so call Computer Lab.

Once you have at least one computer in your school, there are still the following points to be considered before a telecommunication link can be established:

1. A telephone line. About the 50% of our schools don't have telephone in their buildings.
2. A modem, which cost between two to three months of teacher-salary.
3. A subscription to an international network or a similar way to get out the communication from the country. A subscription to Delphi, for instance, costs 80 dollars.
4. And finally the cost of each communication need to be considered.

Taking into account all those factors, the telecommunication activity seems to be accessible only for private schools, with a great buying power. Maybe that is the explanation why in our country, the telecommunication activity is so rare.

An important exception is a private school from Buenos Aires, Argentina, which is participating in the international project "The kids network", driven by The Education Research Centers (TERC) from Cambridge, Massachussets. This school, in order to be able to participate, was provided whit computer equipment and allowed many to support the international telephonic charges.

International support.

Many times, people from developing countries are eligible to receive international support. But receiving the proposal for support is not enough: it is nescessary to be able to use such offer. The most difficult situation to understand in a developing country is that usually there is impossible to get benefit from the international support.

During September 1988 we had in Argentina an important meeting, FIESCO '88, organized by the Ministry of Education. The idea was to allow students from primary and secondary schools, and universities to show each others what they have and expect from computers in education. It was an exposition from students to students and educators. It had a national repercussion and was a special time to allow the students to show what they can do with their imagination when are allowed to.

While I was organizing such meeting, I received a important offer from the United States. Through a special permit from Byte.Net, there was the opportunity to establish a telecommunication during the FIESCO'88, between schools of the USA and Japan and the people attending the meeting. There was no doubt about the benefits and we tried to setup the connection.

To make short a long story, we did not make the connection. There was no way to have the international link and the modem and the computer, all at the same time at the right time. The opportunity was gone and the good intention of the people who offered the connection was lost.

Final considerations.

In a developing country you need to develop a specific skill: being able to achieve similar results with a lot less of support. In that sense, we found a away to allow our students to work with information, even without computers.

However, it was no possible for us to find a substitute for telecommunication, to find a way to introduce our students to the idea of being learners in the Global Village without having telecommunication.

This is a good proof that telecommunication is much more than a new way to do an old thing. We recognize that telecommunication is a new way to see the world and to observe ourselves inserted there. We are looking forward to the time when our schools might be inserted in the network of the present time.

EDUCATIONAL COMMUNICATIONS: THE GOOD, BAD AND THE UGLY

P. P. Resta, University of New Mexico, Barbara Kurshan, Educorp, U.S.A

In the last five years we have seen the rapid proliferation of educational electronic networks at the local, regional, national and international levels. Many networks have come and gone during this time while others have not only survived but continue to grow in number of users and services provided. What is it that helps differentiate the successful from unsuccessful educational telecommunications systems? Although the use of telecommunications is relatively new on the educational scene, are we able to recognize some of the critical factors that relate to an educational network's success or failure? If so, we can help reinforce the "good" and minimize the "bad" and "ugly" in educational telecommunications. In this presentation we will:

- review the services provided by educational electronic networks
- identify critical requirements for developing and implementing networks
- provide some examples of successful electronic networks and discuss some of the features and variables that appear to have lead to their success.

The Services Offered by an Educational Electronic Network

Educational electronic networks offer information and communication services which are designed to meet the particular needs of educational users.

Such services typically include:

Electronic Mail

Using electronic mail, teachers, students or educational administrators may send messages to any other user of the system. Upon contacting the host system, a user will immediately receive any messages and be offered the option of printing the message locally, saving the message to disk, or replying to the message.

Electronic Bulletin Boards

Bulletin boards on such a system offer students, teachers and administrators the opportunity to send "public" mail, i.e., place messages in an open database so that all interested parties might view the messages. As part of the network, multiple, special interest bulletin boards are often provided such as:

- an events board, describing upcoming teacher and administrator meetings, professional workshops, and symposiums as well as those offered by other state, regional and national organizations.

- a request for assistance board, on which teachers and administrators may ask for assistance from State Department of Education (SDE) staff, university faculty or other teachers and administrators locally or nationally.

- special topic/issue boards that include information on specific topics of interest to students, teachers or administrators. For example there are several bulletin boards that contain science information for students, workshop schedules for teachers and bulletin boards for educational administrators that focus on issues such as educational reform, effective school management, evaluation of teacher performance, etc.

- special organizational bulletin boards are established and maintained by national and state educational agencies and institutions, state departments of education and educational professional associations. Examples of such bulletin boards are found in SciNet, a network for state science coordinators, Special Net, a network for special educators, the science teacher network established by our center and state educational networks.

Many of the above electronic bulletin boards are interactive, i.e., they permit students, teachers and administrators involved to post messages or read messages on the network.

Document and Software Libraries

Students, teachers and administrators using an educational electronic network may have access to:

- documents such as important national reports, curricula, summaries of new and important research articles on relevant topics.

- "libraries" of public domain computer programs that may be used to enhance instructional effectiveness and productivity.

Using commonly available software programs, the student, teacher or educational administrator is able to "down-load" an article or program of interest from the host computer to his/her local school or home microcomputer. Once saved to disk locally, the user has local access to the program or document.

Online Databases

The use of online databases has been the initial service that prompted educators to consider the use of networks in the classroom. Databases provide learners and teachers with the facility to gather information, analyze data and solve problems. Databases provide bibliographic listings, sources of information, or printouts of complete articles. Databases cover a variety of areas and can be national, local, topic specific and/or classroom developed. Some recent educational telecommunications projects include the gathering of data for use between classrooms on networks sharing information.

Identifying the critical mass of users for the network

Before a school or school system decides to implement a network, a formal and/or informal survey should be conducted to determine which portion of the population will use the service. This study should examine the computer literacy base, the "real" demand for a network, the support of the administration and the interest of teachers.

Requirements for the Successful Developmentand Implementation of an Electronic Network

In the business world and in education, careful attention is given to the hardware and software requirements for developing a network. However, there's more to networking than just hooking things up. There are a number of critical steps that must be taken to establish and maintain a successful educational electronic network. These include:

- **Assessing the hardware, software, and training needs at each participant school and developing a plan for implementation of the system and training.**

Meetings should be held with the target schools to assess their hardware, software, and training needs, curriculum and the technological experience of the school staff involved. The specific information and communication needs of the potential users should be identified, prioritized and examined for cost-effectiveness.

- **Designing an educational telecommunications system that specifically addresses the identified needs and resources of the schools.**

Based on the results of the needs assessment and information priorities, the system should be designed to provide easy to use computer menus, bulletin boards and help screens for the educational user and to assure the security of communications. The system should also be tested for compatibility with the different types of communication software, computer equipment and modems available in the schools.

- **Developing a training model that incorporates the pedagogical characteristics that best meet the logistical and training needs identified by the users.**

The needs assessment should yield information on the specific technical areas to be addressed in the training and student, teacher or administrator preferences for methodology, training duration, grouping and assessment. Based on this information, a model should be developed which best meets the pedagogical needs of the educational user.

- **Providing training to each school on the use of the Electronic Network**

After the system is installed and operational, training should be provided on the use of the system. The training should include: strategies for using the network to send and receive messages, access bulletin boards, download software, facilitate interagency communications, and as an informational tool in instruction. The training should not only focus on the operation of the system but provide examples of some practical classroom applications for the information resources made available through the network.

- **Providing technical support for the Electronic Network**

After the network has been made fully operational, follow-on training and technical support should be provided to the users either through the on-line assistance, updated training manuals, and site visits (if feasible).

- **Evaluating network uses, benefits and problems**

Data should be collected internally to evaluate the uses, costs, benefits and problems of the network. Such data should be used to make network improvements and to determine whether the network should be continued, expanded or discontinued in the future.

Examples of Successful Networks

The following projects are all currently being conducted in the global classroom. They have all had a positive impact on students and teachers. Many have also encountered difficulties that should be lessons for future users of educational telecommunications. Many of the projects are pilot projects for a selected group of individuals. Many of these projects are in the public domain and can be transferred to another system.

The Apple Global Education (A.G.E.) Network
Apple Computer, Inc.
Contact: Martin Engel, Director

The A.G.E. Network is a new project designed to link students and teachers of the whole world together on an electronic network. This project will utilize Macintosh computers and AppleLink which provides for electronic mail and bulletin boards. Students will be able to send mail, text files and pictorial information using the AppleLink owned and operated by Apple Computer. The pilot project intends to include schools from every country in the world from the first grade through high school. Teachers will share curricular and pedagogical problems and solutions. Innovative use of technology to enhance the educational process will be a topic of discussion among educators on the network. Student projects will provide activities to enhance their understanding of the global community. The initial stage of the project will target 50-100 sites by October, 1989. This project is an excellent model for the use of international connections. Students find the international connection to be one of the most exciting parts of educational telecommunications.

AT&T Long Distance Learning Network (LDLN)
Contact: Cindy Brinkman, Project Manager

AT&T LDLN is a pilot project designed to promote classroom interaction in specific curriculum areas. The network currently provides electronic mail, curriculum guides, a school matching service, front end telecommunications software, 800 access to the network and online or telephone technical support. The network structure is based on research from the InterCultural Learning Network. (The InterCultural Learning Network was one of the pioneering projects in educational telecommunications. It was started at the University of California in San Diego by James Levin, now at the University of Illinois, Margaret Riel, University of California at San Diego, Naomi Miyake of Aoyama Gakuin Women's Junior College and Moshe Cohen of the Hebrew University of Jerusalem.) This project models a merger between the educational and commercial world

FrEdMail Project
San Diego County Office of Education
Contact: Al Rogers

FrEdMail is a free educational electronic mail network developed under a California Educational Technology Development Project. FrEdMail includes 70 bulletin boards (mostly in California). The coordinators of each bulletin board work together in a system-wide conference. In addition, there are two network-wide open conferences; an IDEAS exchange for teachers and KIDWIRE, a bulletin board to post students' work. This online service is minimally funded from the Education Department of California. The software and connect time is free to the user, but users are obligated to return the cost of running the network by helping to operate and maintain the services on the network. This network is an excellent telecommunications model for other states and school districts.

KIDS Network
National Geographic
Contact: Monica Bradsher (National Geographic

KIDS Network is part of the National Science foundation's program initiative to develop new science curricula for elementary schools. The goal of the network is to increase the role of students as active learners, improve problem solving and expand the resources committed to science education. TERC and National Geographic have created curricular materials and telecommunications software with Geographic as the publisher. The programs consist of a series of units to be used in the on Apple Computers. The software with the curriculum is available for purchase to use databases and telecommunications. Topics include an introduction to telecommunications, acid rain and weather. It is curriculum based and liberally uses databases to develop problem solving skills. This project models the use of a network to deliver a curriculum that is easily integrated into the existing classroom.

Learning Link
WNET/Thirteen
Contact: Robert Spielvogel, Director

Learning Link is an interactive communications system, in operation at the television station WNET/THirteen. It provides a model for effective and cost efficient serving of K-12 on a regional basis. The service is a text-only multi-user system that includes databases, bulletin board-like conferences and electronic mail. The information on the network is designed for teachers who utilize learning technologies such as television, video, microcomputers, videodisc and/or on-line databases. The system has the capability of providing gateways to some other network services. This service was publicly launched in October 1985 and has run 24 hours a day, 7 days a week. Schools are not charged by frequency or form of use. Each school pays an annual membership fee, based on population of school district, for which they receive passwords to the system for designated staff members. Usage of the system is unlimited and users can call in from any micro at school or at home. This project is a model for the merging of two technologies - television and telecommunications. It also provides some unique insight into a "top-down" delivery system rather that the bottom up (i.e. administration versus student).

ORILLAS
De Orilla a Orilla (From Shore to Shore)
Yale University, Psychology Department
Contact: Dennis Sayers, Editor, Bilingual Literacy Correspondent

The goal of Project Orillas is to promote Spanish language literacy by providing a motivated context for writing. The use of a network helps link students to a wide world of language learners. The writing materials are designed to investigate the interaction of speaking and writing while studying a foreign language. The project has now been expanded to include all Enterteachers in bilingual, ESL and foreign languages in the US and other nations with computers and without computers. The choice of a network for e-mail is determined by the Sister Classes. This project is funded by grants and donations. Each school covers their own communication costs. This project is a model for foreign language study on networks.

SpaceLink
NASA Educational Affairs Division
Contact: William D. Nixon, Chief, Educational Technology Branch

SpaceLink is a computerized information access system for educators. It includes information on NASA's programs, educational activities, e-mail and contact with space experts. The information could be integrated into the math and science curriculum and could be used to introduce telecommunications. The cost for this system is funded by NASA and the school. SpaceLink is a model for providing government support, resources and data to the learner.

Star Schools Project
TERC Communications
Contact: Cecilia Lenk, Project Director

The TERC Star Schools Project combines technology with hands-on experiences in science and mathematics. Using microcomputers and a telecommunications network, students in grades 7-12 engage in large-scale cooperative investigations and share findings with students and professional scientists across the country. With support from the network, teachers and students create an active learning environment. Topics studies include solar design, radon, weather, patterns for iteration, trees and tides. This project is funded by a $2.5 million grant from the US Department of Education. This project provides a model for the unique integration of computer tool applications, curriculum based projects and telecommunications.

The following networks are commercially based and show the good and, unfortunately the ugly side, of trying to provide telecommunications to the education market.

Campus 2000
The Times Network Systems Limited
Contact: Gordon Jones, Chief Executive

Campus 2000 provides education in the United Kingdom with an electronic communications and information service. Campus 2000 is the integration of the former TTNS and Prestel Education services. It is operated jointly by TTNS and British Telecom. TTNS is responsible for all promotion, marketing and sales of the service with British Telecom providing all computing and networking resources. Campus 2000 is distributed over the Dialcom Communications network. Over 9000 subscribers use the the system with 20 countries participating. The service is designed for use by educational administrators, teachers, students in the classroom. Services include electronic mail in the United Kingdom and internationally, databases of both national and local information, a notice board and computer conferencing. Special online activities include newsday, learning activities designed for use with online databases, exam practice and mock elections. US users are able to access the system through TYMNET. Other international users are on Campus 2000 through country sponsored data networks. This project shows the special connection that is possible between K-12 education and higher education and is a model that is used in many state education networks.

MIX
McGraw-Hill Information Exchange for Educators
Contact: Grif Wigley, Publisher

MIX is a commercially available telecommunication service for educators - administrators, teachers, students and parents. The technical support and leadership of the network is provided by McGraw-Hill and includes a large number of teachers and other experts who serve as conference moderators. The network is divided into open and closed conferences available through an easy to use menu format. The three major exchanges are Student Information Exchange (STIX) for student projects, Educational Technology and Professions Conference Group. Several of the conferences include international participants. In addition, the network provides electronic mail, online games and projects for students and bulletin boards.

Tandy's WorldLink Project resides on MIX. The objective of the project to to use telecommunications as a means of getting schools together so that they can share their unique experiences through writing. Over 50 international schools and
50 US school have participated in the project. Topics covered during the initial year of the project included discussions of clean water, the United Nations and local celebrations. This project will probably continue on a new service once MIX is
closed.

This network provides a model for a commercial educational service. However, since MIX resides in the business world, it is governed by commercial profit guidelines. The lack of profitability at this stage has caused McGraw-Hill to shut down the network as of Summer, 1989. This network has provided the K-12 educational market with a network for them but it's demise has pointed out the high cost of telecommunications and the lack of funds in the educational market.

PeaceNet
Institutefor Global Communications
Contact: Mark Graham, Director

PeaceNet II is a computer network for the world's peace movement. The network enables users throughout the United States and in 70 other countries to communicate with one another through electronic mail, conferences and databases and a
user directory. Conferences address issues such as Star Wars Funding, Central America and Soviet relations. PeaceNet and EcoNet (EcoNet is another network sponsored by the Institute for Global Communications on ecology) also publish a monthly written newsletter through the Institute. PeaceNet provides access to
information that is exciting, current and relevant to content areas in geography, history, social studies, government and writing. In addition, the monthly newsletter contains many thought provoking articles that suggest important issues for online teleconferencing. This network which is issue driven provides an excellent model for curriculum development as the driving force on an educational network.

Will Electronic Networking be Successful?

The examples of educational electronic networks I have described are only representative of the telecommunications systems that are emerging to address the needs of students and educators across the globe. The ultimate success of educational electronic networking will depend on a number of factors, including:

- **the value of the information provided to teachers and students and the impact it has on the quality of instruction in the classroom**

  The agencies, institutions or organizations sponsoring electronic networks must be able to carefully document the impact of the on-line services on teachers and students. Among the critical questions that must be answered are: (1) How often are the networking services used, by whom, and for what purposes? (2) If funded by private or external sources, is there a plan and commitment for the using schools, institutions or educational agencies to continue the services in the future out of there operational budgets? (3) Is there evidence that the services provided actually improve teacher (or student) skills and knowledge or reduce the professional isolation of teachers? (4) Do teachers think the services are important and want them continued?

- **the ease of access and use by teachers**

  To be successful, the network and data bases must be simple and easy to use, even by teachers with little experience in working with computers. The better systems will contain menus that allow teachers to make choices in natural language without using cryptic codes or commands. In addition, teachers will need to have 24 hour access to the system. Some of the "night owl" teachers, like me, will want to get on the system at 3:30 am (when they wake up and can't go back to sleep). Lastly, the host system must have sufficient phone line and computer capacity to allow teachers to easily get onto the system. If teachers dial in and frequently get a busy signal, they will soon lose interest in using the services.

- **the training provided to teachers in the use of the new communications technologies**

  The use on on-line services will be a new experience for most teachers. Therefore, the success of the networking projects will largely depend on the quality of the training given to the teachers. Training programs must be provided to enable teachers to learn how to get on the network, find the needed information, and to send messages. Equally important, the training program should be designed to help teachers understand the strategies for integrating the on-line services into their classroom instructional activities and plans.

- **the equipment, software, phone-line and operational costs for using the networks**

  There are two types of costs associated with the teacher-based electronic networks. These include the initial set up costs and the operational costs of continuing the network. For schools, the initial set up costs include such things as acquiring computers (if none are presently available), purchasing modems (devices that enable the computer to communicate via the phone), installing phone lines to the classroom, acquiring the communications software, etc.

  The operational costs include such things as the monthly phone charges for using the network and any subscription or use charges that must be paid to the organization providing the networking services.

Summary

In summary, the rapid growth in the use educational telecommunications provides us with exciting new opportunities for facilititating cross-cultural understanding and accessing expertise and information resources across the globe. If we are to obtain the full benefits of this emerging technology, we must look carefully at both our past and presen t successes and failures. Only in this way can we hope to continue to improve the use of educational electronic networks in the future and to increase the "good" while avoiding the bad and the ugly in educational telecommunications.

TELECOMMUNICATION: CONNECTIONS TO THE FUTURE

Margaret Riel, InterLearn, U.S.A.

Ten years ago the word "computer" conjured up an image of large machines located in the basements of universities and businesses operated by skilled technicians. But, since that time, microchip technology married to a vision of portable computing power has given birth to the personal computer and with it a completely new orientation to electronic information.

This rapid development of computer technology came as a surprise to many sectors of the society, including the educational community. The classroom teachers of the 80's found themselves expected to work with this new technology with little or no prior training. Computer literacy courses made it possible for teachers and students to learn about computers from the inside out and to marvel at things computers will be able to do in their lifetimes.

Paired with rapid developments in computer technology was a large increase in the number of technologically skilled educators who took on the task of planning for future innovations. Magazines, journals, conferences, task forces, educational centers and university programs were developed to support their development. The limited computer literacy orientation was soon replaced by more innovative efforts to integrate computers into the schooling process. These newly trained educators began to teach *with* computers rather than teach *about* them.

The new forms of teaching and learning made possible by electronic communication poses exciting challenges. For the educational community it offers the key to escape from the physical isolation of classrooms. Group interaction across distances facilitated by computer telecommunications is qualitatively different than that provided by phone, memos, and postal mail and offers new strategies for teaching and learning. It is this potential--the ability to create and maintain group interaction among people dislocated in time and space--that attracts the technically skilled teachers of the 90's.

Current technology makes the creation of an educational network possible. However, building a community of educators and students is not a simple task of installing computer technology. The promise of a new social organization, an electronic community, is not easily realized. The evolution of local, national and international networked communities is an important educational phenomenon.

The purpose of this paper is to examine the development of this community of information-age pioneers who are blending educational concerns with communication technology to develop and implement new educational settings. These pioneers share a vision that the power of telecommunication will provide a new avenue for professional development as well as provide opportunities for students to work collaboratively with students in distant locations. In doing so, these teachers demonstrate their eagerness to use the tools of the present to build the future.

"What can be" is the topic of this paper. How successfully has the challenge been met? What is the cost/benefit ratio of educational telecommunications? In order to address this question four large scale experiments exploring the role of telecommunication are explored, each of which seeks a cost-effective means of providing meaningful education utilizing the tools of the information age.

Comparison of Educational Networks

Researchers have been exploring different strategies for examining the interaction that takes place on networks. There have been studies that focus on the effect of networks on increasing students' writing skills (Riel 1985, Cohen & Riel 1988); on the development of students' problem solving (Waugh, Miyake, Levin & Cohen) and science skills (Newman 1986); and on the design of these new instructional contexts (Levin, Kim & Riel 1988). A research strategy that has been

356

successful in comparing the structure of successful and unsuccessful educational networks is participant structures (Riel & Levin 1985).

Participant Structures

"Participant structures" have been used as an analytic framework for comparing interaction across educational settings (Phillips, 1972, and 1984). Examining the participant structures of group interaction has helped explain why students from certain cultures systematically function poorly in the conventional western classroom setting (Mehan, 1979; Au, 1980; Moll & Diaz, 1984). They have also been used to compare classroom interaction with and without the presence of computers (Mehan, Riel & Moll 1985). We modified Phillip's provocative notion to construct a framework for describing computer networked communities (Riel & Levin 1985). This framework helps isolate features that correlate with successful patterns of network interaction. Participant structures used to examine network interaction in this paper are the following.

1) ORGANIZATION OF THE NETWORK GROUP: its size, common knowledge, interests, past experiences, and the physical location of the participants

2) NETWORK TASK ORGANIZATION: the types of activities that participants engage in over the network

3) RESPONSE OPPORTUNITIES AND OBLIGATIONS: ease of access to the interaction, including social and technical resources for sending and receiving messages, and the tacit or formal requirements for responding to a message

4) COORDINATION AND SUPPORT: the structures for facilitating group interaction, support for technical and curriculum development on the network and means of assessing the quantity or quality of the exchanges on the network

These four participant structures will organize the comparisons among four networking communities that are exploring the potential of electronic communication in education: (1) AT&T's Long Distance Learning Network (LDLN), (2) CMS Free Education Mail System (FrEdMail), (3) The McGraw Hill Information eXchange (MIX), and (4) The National Geographic Kids Network (Kids Net). The information for these comparisons came from interviews with key people in the development of each of the networks, and in most cases extensive time on-line exploring the electronic meeting places. All of the networks are in the process of change, so these comparisons are based on the operation of the networks during the first half of 1988.

ORGANIZATION OF THE NETWORK GROUPS

Participants on a network can range in number, amount of past experience, degree of common interest, and their relationships within the group. Networks range in size from very small groups to groups of indeterminate, changing size. Network participants can range from those who interact only by electronic mail to those who have personal contact and use electronic mail to organize their work. In some networks, participants have shared a commonexperience, such as a class, conference or project. In others, the network interaction is the only shared experience among the participants.

A comparison of the group structure for each of the networks is summarized in Table 1.

Group factors	AT&T LDLN	FrEdMail	McGraw Hill Mix	Nat Geo KidsNet
SIZE OF NETWORK	275 users	80 boards with indeterminate number of users	2,000 subscribers	200 users
PROFESSIONAL STATUS OF PARTICIPANTS	Teachers, School/ District Admins. Univ. Educators Researchers	Teachers, studs School/district Admins. Univer Teacher educators	Teachers, School/ District Admin. College and Univ.	Teachers, Researchers Unit scientists
LOCATION OF . PARTICIPANTS	US, Netherlands Australia, Japan Germany, Canda & France	US, Argentina. Puerto Rico Australia Argentina	US, Mexico, Canada Puerto Rico, Japan	US, Puerto Rico Hong Kong, Israel & Argentina
GROUP FORMATION	Teachers/studs. assigned to learning circles based on their interest, grade level and location	2 large groups with open participation smaller groups by user request	open and closed. forum, individual selects with help of host who helps new users	One large group with teachers assigned to clusters with geographic diversity
PRIOR CONTACT	minimal/none	Casual/none	Casual/none	minimal/none
COMMON FORM OF INTERACTION	group, 1-many (Learning Circles)	1-1; 1-many (Conferences)	1-1; 1-many (conferences)	1-many, group (Clusters)
NUMBER AND SIZE OF NETWORK GROUPS	37 Learning Circles 4-8 classrooms per Circle	3 large groups with 50-60 teachers many small projects 2-10	60-70 conferences average 15-25 teachers in each	1 large unit group 15 clusters, 10-20 classes per cluster
OTHER FORMS OF REG. EXCHANGE	no for most	yes for many	yes for some	no for most

Table 1: Comparison of Participant Structure 1 - Organization of the Network Group

AT&T'S LONG DISTANCE LEARNING NETWORK is a test project for a possible commercial service organized to facilitate group interaction integrated into curriculum areas. The structure of the network is based on research from the InterCultural Learning Network research project exploring the potential of educational networking (Levin, Riel, Miyake & Cohen 1987). In the Spring 88 trial there were about 275 national and international teachers and about twenty district coordinators, university educators and researchers.

The teachers were organized into 37 groups, called Learning Circles, consisting of between four and ten classrooms around a selected curriculum topic. Many of the groups had one or more international partners from Canada, Australia, France, Germany, The Netherlands, and Japan. The teachers in each group were in regular communication with all the members in their group. There were also a few large conferences in subject areas or around a particular topic with moderators open to all teachers and access to a social science data-base. However, group interaction within Learning Circles was the predominate form of exchange for most of the participants.

FREDMAIL is a distributed system of almost 70 bulletin boards, each with a variable number of users. Two-thirds of the boards are in California with most of them in the South. FrEdMail has two boards each in Argentina and Puerto Rico.

A subset of the users of any one board makes use of the inter-board communication potential. The inter-board users form the heart of the FrEdMail community and the group that is considered in this review. The participants include teachers at all educational levels as well as district and university teacher educators. There is no central location or central control of the community. The system operators of each of the bulletin boards provide the leadership and support. They work together in a closed system-wide conference, (CMS.SYSOPS), moderated by Al Rogers, to develop the educational, social, and technical aspects of the network.

In addition to the CMS.SYSOPS conference, there are two network-wide open conferences: IDEAS for teacher exchange and KIDWIRE for teachers (and in some cases students) to post students' work. These conferences are available from a menu of selections from any board. IDEAS provides a place for teachers to organize student projects, exchange information about a range of topics, locate resources, and provide technical support. Over a three month period, about sixty different people sent 150 messages to IDEAS with an indeterminate number of teachers reading and possibly responding through private e-mail. Over half the messages were sent by eight regular users with thirty four users sending only one message during the three months.

Some of the messages sent to IDEAS are requests to begin projects. In some cases the project is conducted in the public setting of KIDWIRE, but in most cases there is no way to tell if a project has been set up privately through an inter-board message group or e-mail, or if the request went unanswered. Creating and maintaining group interaction is left to the participants.

MCGRAW HILL'S INFORMATION EXCHANGE is a commercially available telecommunication service. At present, it has over 2,000 subscribers with the host mainframe computer located in Eden Prairie, Minnesota. The technical support and leadership of the network is provided by McGraw Hill and includes a large number of teachers and other experts who serve as conference moderators.

The networking community is divided into a system of 60-70 open and closed conferences arranged in conference groups and presented in a menu format. New users are assigned hosts who help them find conferences of interest. Teachers join or leave conferences at any time. The three major groups are Student Information Exchange (STIX) which organizes student projects, Educational technology , and Professional Conference Groups for exchanging ideas and information on a range of different topics. Each of the conferences is organized and managed by a conference moderator. The size of discussion conferences varies greatly, but the successful project conferences organized in STIX averages between 15-25 teachers.. A number of the conferences include international participants from Japan, Mexico, Australia, Canada, and Puerto Rico. While the conference structure defines the community, the most predominate use of the system is electronic mail between individuals.

THE NATIONAL GEOGRAPHIC KIDS NETWORK is part of the National Science Foundation's program initiative to develop new science curricula for elementary schools. The goal of this program is to increase the role of students as active learners, foster problem-solving, and expand the time and resources committed to science in fourth through sixth grade levels, using science lessons integrated with telecommunication. The National Science Foundation and National Geographic have funded the Technology and Education Research Centers (TERC) to create the curricular materials and telecommunication software to be published by National Geographic. Apple Computers provide an equipment grant that placed the computers and modems in the classrooms.

Two hundred teachers of fourth to sixth grade students formed a single group for the exchange of data from the science experiment in a single science unit. Classrooms were placed in clusters of between ten and twenty classrooms for the teachers to discuss the implementation of the curriculum, and for students to discuss their findings. Teachers' most frequent interactions were with teachers in their own cluster, but they also had the option to interact with teachers in other clusters. The goal of this group was primarily to test and evaluate the curriculum packages and only secondarily to to test the telecommunication network operation and feasibility.

Summary of Group Organization: The networks all vary in their organization, but there are two general models represented by the group structure. Both FREDMAIL and MIX have implemented a conference structure. Similar to a face-to-face conference, an electronic conference is a meeting which individuals join to listen to new ideas, participate in question answer discussions, discover new resources and locate and develop relationships with colleagues who share common interests. The central location and economic base of MIX enables them to offer a richer selection of conferences which are displayed in a menu format. In both cases, individual teachers enter or leave conferences at will, and take on the responsibility of structuring their own learning experience.

The LDLN and the Kids Network overall structure might be described as a task-force committee structure. A number of participants come together for an agreed period of time to accomplish a specific goal as a unit. The teachers and students began at the same time and shared a commitment to the group to continue working until the goal was accomplished. The task group organization varied with LDLN Learning Circles operating as self-sufficient units, while Kids Network clusters were subunits of a large task-force unit.

NETWORK TASK ORGANIZATION

Networks serve as a communication medium for a group of people with some common interests or background. Beyond that, networks vary greatly in terms of the specificity of the activity that is supported. For some groups, the activity is only specified in the broadest terms, such as to facilitate cooperative tasks, exchange information or share ideas. In other cases, the form of the interaction is highly specified with a particular goal to achieve, such as the publication of a paper or the development of a product, with well-defined responsibilities and timelines for the interaction.

The organization of the network tasks is compared in a summary form in Table 2.

Task features	**AT&T LDLN**	**FrEdMail**	**McGraw Hill Mix**	**Nat Geo KidsNet**
Group Goal Specified	Specific goals for Learning Circle in print and on-line	Broad goals for conferences. implicit	Specific goals for conferences set by moderator in first message	Specific goal for curriculum units in print and on-line
Print Project Materials	Yes	No	For some project conferences	Yes
Task Duration	Semester session	Open for most	Open for most	6 week units
Timeline	For all L. Circles	For some tasks	Within some conf.	For all Clusters
End Product Report/Public.a.	Expected	Not generally expected	Not generally expected, sometimes provided	Provided
Teacher support for Conclusion of Project	Yes	In some cases	In some cases	Yes

Table 2: Comparison of Participant Structure 2 - Network Task Organization

THE **LDLN** required teachers to make a selection from the Learning Circles topic prior to their participation. Teachers were grouped into a specific Learning Circle according to their chosen topic, educational level (primary, middle and high school) with an effort to provide geographic and cultural diversity within the groups. Some of the Learning Circle topics were Places and Perspectives (geography and social science), Computer Chronicles (journalism). Mind Works (creative writing) Human Environments (ecology) and Animal Life (science).

Teachers were given examples of projects, but they were also free to create their own activities. Each Learning Circle had a coordinator who helped the teachers plan, evaluate and implement projects with a networking component in their classrooms. A timeline marked the beginning and ending of the Learning Circle interaction as well as critical junctures along the way. Each classroom was encouraged to create a final report or publication to share with partner classes. This final product required students to look back and evaluate their learning. It also provided a measure of the success of the Learning Circle.

FREDMAIL relies on teachers' and educators' volunteer time to create all of the tasks that take place over the network. Each individual board offers a range of networking activities for a local audience which differ widely in terms of quality and appeal. As already mentioned, IDEAS is the open channel that can be used by any teacher to introduce, plan, and organize an activity with cross-board participation. Any teacher can volunteer to be a project or discussion moderator, however many project initiations go unanswered.

If a teacher's proposal generates a single response or a group of responses, the project is usually conducted through the use of private electronic mail. Once the group leaves the general IDEAS conference, it becomes more difficult for new users to know that the activity is taking place. A monthly summary of the IDEAS messages, and a print newsletter listing the project ideas has helped make these activities more public. A newer version of the system software plans to expand public access to these project activities.

Many of the projects suggested are new ideas by novice users. Therefore, they lack the planning and implementation that come with experience in designing telecommunication curriculum. Often the educational design is less important than the excitement of distant communication. These projects rarely have extensive planning project timelines, or the expectation of a finished product from each of the classrooms. Generally, students are asked to participate in a project by providing some information or writing. This material was either sent directly to the teacher who proposed the project, or the material was posted in KIDWIRE. Once the information is supplied, the classroom waits to see what the moderator has found out or will do with the information.

A small number of projects, usually moderated by the more experienced teachers, are very successful including a Letters to Santa project, story chains, newspaper writing and a vacation guide. But many other projects never get past the initiation stage which can be very frustrating for the teachers who introduce them.

MIX provides a forum of open and closed conferences with networking tasks designed for teachers' professional development and for classroom participation. The Student Information Exchange (STIX) is the the area for listing classroom activities. The STIX conferences were set up by and facilitated by moderators working for McGraw Hill. Each conference has a similar organizational structure with a "welcome message" that establishes the goal of the conference. Some of the projects available for classroom teachers were very well designed and provided the participants with explicit instructions on how to proceed. In a few cases, the moderators sent out materials to each of the teachers who "registered" for the activity.

The form of participation is controlled by the teacher, acting as a moderator. The moderator defines the task, the goals and the form of participation. Other teachers have their students submit questions, provide information, or do the experiment. They send that information to the moderator. A teacher may read and comment on what other teachers have supplied but the majority of the interaction is between a moderator and teacher . The moderator and the task remain constant but the participants join and leave the interaction whenever it is convenient. In many of the student projects there is no specified ending point and no final product. When a project ends, it is generally the project moderator who creates the summary of the project.

Some of the more successful conferences have been a fingerprint analysis project, Plant growth contest, a global cultural exchange project and bilingual exchanges.

KIDS NETWORK assigns teachers to clusters through the use of a computer program that maximizes geographic and cultural diversity. The clusters work on a science unit for a period of about six weeks. The goal of the project is to involve more students in scientific thinking, hands on experimentation, geographic understanding and data analysis. They plan to develop a total of eight units. The three units that were under evaluation during the time period described were Hello, Acid Rain and Weather. The curriculum packages includes teacher and student handbooks, instruction for an experiment, and computer software for sending, receiving and displaying data.

The data from the classroom experiment were sent by TELEMAIL, to a central location at a specified time, pooled, and returned to the classrooms. The data base is displayed in different formats within the project software. The final part of the project is moderated by the unit scientist who comments on the results and poses questions or problems via electronic mail to all of the students.

Summary of Task Organization: The networks were selected because they have all defined the support of educational activities at the classroom level one of there central goals. The LDLN and Kids Network were organized around specific tasks with supporting print materials and timelines. FrEdMail depended on teachers who volunteered their time to organize and facilitate projects. MIX supported a wide of moderated tasks publicly available to any user.

The networks differ in terms of the control of the task. FredMail and LDLN have taken a decentralized approach to control of the classroom activities. In FrEdMail it is entirely up to teachers to propose organize and implement networking activities. Teachers can propose activities that are perfectly aligned with their teaching objectives. However, the task of finding other classrooms that share this interest and are ready to work on a given project at a specific time is often a frustrating one for teachers. Often good ideas fail to achieve results because partners were not available.

The LDLN helps match teachers that share common interests and establishes a common timeline for networking activities and a list of suggestions. The projects selected or creation of project was under the control of the classroom teachers working within their group

The Kids Network and Mix maintained central control of the learning activities. The Kids Network was created as a part of the development of curriculum materials. The activities online are well defined and everyone on the network was to be following the same sequence at roughly the same time. While this structure was very reassuring for teachers who had never used telecommunications before, those with more experience suggested that more time be devoted to teacher controlled ideas.

MIX maintains a central control by having a set of moderators define an activity and present it to other users. The activities are screened through a central organization and the moderators work with one another to design the best possible applications of their ideas. This led to a selection of 10-15 activities for a teacher who would like to involve students in telecommunications. It does not make it easy for teachers or students to organize their own activities. However, MIX has a policy of reviewing any teacher's idea for possible inclusion in the STIX conference structure.

RESPONSE OBLIGATIONS AND OPPORTUNITIES

Response opportunities on a network refer to the ease of access, the presence of electronic equipment and the expertise necessary to use it. How difficult is for participants to send messages.? Is the communication equipment located in a central location at work or is it possible to send electronic mail directly from one's classroom or home? Another aspect of this participation structure is the alternate means for responding to people on the network. The electronic medium is one of a number of communication media that are generally available for the exchange of information. The comparative ease and costs of these other systems will influence the response opportunities and obligations on an electronic network.

There are tacit assumptions of response time for any form of communication. In face-to face-interaction, a pause of more than a few seconds is often marked as uncomfortable by participants,. However a year may be seen as an appropriate time period in which to receive a response to questions asked in a Christmas card. When we send postal mail to a person, we operate on the shared convention that mail collecting is a daily activity. While electronic mail may be delivered efficiently, shared assumptions about how often electronic mailboxes will be checked do not immediately exist. Therefore, the participants often need to create their own conventions on a network as to what is an appropriate time delay to wait for a response. In a networked community, this participation structure examines the response conventions as well as obligations. Table 3 summarizes the task structure across the four network projects.

Response	AT&T LDLN	FrEdMail	McGraw Hill Mix	Nat Geo KidsNet
OPPORTUNITIES	school/home	school/home	school/home	school
RESPONSE TIME EXPECTATIONS time	daily-weekly	daily-weekly	daily-weekly	daily-weekly data at specified
MESSAGES READ AND CREATED	Off-line	Online	Online	Off-line
RESPONSE Participants	Circle Participants	Sysops	Confer. Moderators	Cluster
OBLIGATIONS	Circle Coordin. District Coordin. Telecomm. Experts.		Network hosts Telecomm. Experts	TERC Staff Unit Scientist

Table 3: Participation Structure Three - Response Opportunity and Obligation

LDLN is a specially designed environment of the AT&T Mail Service. It is a multi-user 800 number service that is organized into Learning Circles through the technology of shared mail folders. The 800 number service enables teachers to work with no hourly charges or increases for daytime access. All mail sent to shared folders was automatically distributed to the group of people who "share" the folder (the members of the Learning Circle) as well as stored online chronologically for future reference.

Learning Circle coordinators usually responded to messages sent by teachers in a Learning Circle within the same week. There was also a team of on-line telecommunication and curriculum resource people who responded to mail daily. Teachers and students in a Learning Circle had a responsibility to the group to accomplish their part of the project activities. The normal expectation for a response from a learning circle partner was between two and ten days, depending on the type of information requested.

Communication software interface programs was developed for the AT&T, IBM, Apple II and Macintosh machines which minimized on-line time. Messages are read, responded to and filed in a simulated on-line mode. When mail has been prepared to send, a single stroke command initiates an automatic mail exchange in which outgoing mail is transmitted and new mail is received. Because the time spent online is limited, it is possible for teachers to do most of their work on computers without modem or phone line connections. Then when ready for a mail exchange, the teacher takes the disk to a communication computer and leaves it to automatically exchange mail. However, many of the teachers working on LDLN had access to the network in their classrooms and many had home access as well.

FrEdMail has a dedicated number of regular callers who have access to computer networking, both in their classroom and at home. There are, however, many teachers who have to go to the school library or computer lab to find a computer, modem and phone line. The ease of access determines how regularly a teacher checks electronic mail. The number of computers, as well as ease of access , influences a teacher's choice to undertake a project.

In order for FrEdMail to serve as an efficient means for sharing information, system operators must be on the system daily validating new users and maintaining their bulletin board activities. Other teachers need to check mail on a regular schedule. The limited storage system of many of the bulletin boards makes it necessary for users to read and delete mail at least weekly. FrEdMail users usually work on-line, only using the download functions for longer "attached" messages. Classroom materials and long messages are prepared off-line and are uploaded. There is a thirty-minute limit for each session since each board supports only one caller at a time. Most, but not all, boards operate on a twenty-four hour basis. New boards are created when the number of users of a single board increases to the point of causing access problems.

System operators have an obligation to respond to problems and requests of users promptly. Often this is done as a volunteer service to the educational community. The California State Teacher Education and Computer Centers (TECCs) initially provided support for the development and guidance of the electronic communication. University educators have also played a key role in providing leadership for the FrEdMail community.

MIX provides a twenty-four hour, multi-user system. The conference format of MIX encourages on-line exploration. Ease of access to computers, modem and phone lines is necessary to integrate MIX activities in the classrooms. They suggest that teachers budget for an average usage time of thirty minutes on-line per week.

The conference moderators are supported by McGraw Hill and have an obligation to check mail daily and organize their conference discussion or classroom activities. Each new user is also assigned a host to help them become acquainted with the MIX community. A user can also expect that the host will respond to any inquiries. McGraw Hill supports a team of telecommunication experts who will respond to teachers requests. The teachers have no responsibility to join in on any of the many activities available to them. The public nature of the conferences makes it possible for the MIX staff to judge the quality of the activity and the level of participation. This review process is an important step in exploring curriculum development and professional education in this new format.

KIDS NETWORK is linked together through the use of Tymnet computers. In this system, teachers and students work off-line on a communication software program developed by TERC called TELEMAIL which handled the transmission and reception of mail. This system minimizes the amount of time that a teacher must spend on a communication computer. Teachers have access to the network from their classrooms.

Any problems with the system, the software, or curriculum were sent directly to TERC. Teachers responded to one another about the implementation of the science unit in their classroom. Participation in this project required a commitment from each teacher to be an active partner in the interaction. The expectation was that teachers would send the experimental data on the specified date and respond to their messages in their cluster within the week.

Summary of Response Opportunities and Obligations: The conference model of FredMail and MIX requires a high use of online connection to host computers. This involves the dedication of a phone line and unknown costs that are based on length of time of the work sessions. The central large computers hosting MIX provide a more stable technology but costs increase with distances from the host or computer links to the hosts. FredMail has a decentralized technology that chains computers together and breakdowns in one link of the chain can interrupt service.

The response obligations of the sysops and anyone who volunteers to organize activities on FrEdMail is high, but, as a volunteer activity, it is often difficult for educators to fulfill their response obligations. Each of the other networks support the group of people who are obligated to respond regularly. There is likely to be more variation in response times within each of the group populations than there is across the groups.

The structure of FrEdMail and MIX does not place a high response obligation on the part of teachers who use the system. In the conference format, the teachers are free to structure their level of participation. Participation on the LDLN and Kids Network requires a teacher to accept from the onset a response obligation described in the print materials.

NETWORK COORDINATION AND SUPPORT

Just as there are numerous ways to lead a face-to- face group, there many ways to coordinate an electronic discussion, each of which is suitable for different kinds of groups engaged in different kinds of activities.

Table 4 summarizes the coordination and support structure for each of the four networks.

Coordination	**AT&T LDLN**	**FrEdMail**	**McGraw Hill Mix**	**Nat Geo KidsNet**
TECHNICAL SUPPORT accepted FOR NETWORK	AT&T 800 number	Volunteer Sysops	MIX 800 number	Collect calls
NETWORK DOCUMENT	AT&T Mail user guide, Teacher guide	Teacher guide	Tutorial with print guide	Tutorial, Teacher guide
TAILORED COMMUN. SOFTWARE	ACCESS (Macintosh, AT&T/IBM, & Apple II family)	FredSender (Apple II family)	No	Kids Network Software package (Apple IIgs only)
SOFTWARE SUPPORT	Yes	No	n/a	Yes
CURRICULUM Develop. SUPPORT	Learning Circle Coordinators Curriculum Consult.	Volunteer Sysops/Other	Conference Moderators	Curriculum Staff at TERC McGraw Hill Staff
ON-LINE TELECOMM EXPERTS	Yes	Volunteer only	Yes	Yes
MEANS FOR SHARING users IDEAS ACROSS GROUPS	Coordinator circle News Conference Print Newsletter	News bulletin Print newsletter	System.news, Hosts Print Newsletter	Messages to all Print Newsletter
PRICING STRUCTURE	Learning Circle Fixed rate planned (no cost at pres)	Telephone cost from local board for most, long distance rates for some	Yearly fee for all, Tymnet costs for many	Science Unit Fixed cost planned (no cost at pres)
FUNDING SOURCE Geographic Fnd.	AT&T	School/District State Funding	School/District Funding	National National Science

Table 4: Participant Structure 4 - Coordination and Support

LDLN provided initial training of new users in a particular location by workshops sponsored cooperatively by AT&T and university schools of education or school district computer educators. University and district personnel remained on-line and off-line as a source of help for individual teachers. The AT&T Mail Service provides technical support on-line and through an 800 phone number. In addition to this general technical help, on-line help was available from the LDLN staff for technical as well as curricular issues. Each Learning circle had a coordinator to help the other teachers carry out their projects as well as respond to any other issues or concerns that teachers expressed. The success of the Learning Circle is determined through the evaluation of the classroom reports or publications as well as the teachers' evaluation of the project.

The trial that ended in June 1988 was funded entirely by AT&T. Future trials will have a fixed cost for Learning Circle participation with no additional connect or message charges.

FREDMAIL operates entirely as a distributed system with no central location. All the coordination is created by dedicated educators who have volunteered their services. There is no designated conference moderator for either of the two open system-wide conferences. The support materials are minimal. The California State Education Technology Committee has provided some minimal resources to promote the development of the software and the publication of a quarterly newsletter. The system operators on FrEdMail are called on to solve technical problems, provide leadership in the development of classroom applications, and to facilitate the transfer of important information throughout the community.

The cost to the users is a telephone charge to the local board. The cost of each the 80 boards is the computer, modem, dedicated phone line, and time spent by the system operator. The cost of the nine "hub" boards also includes the long distance charges to call other boards. This system has been supported by the State of California, and university and school districts throughout the nation.

MIX has a well developed system of support for new users. New users are sent a tutorial to help learn the system without the cost of on-line time.. Technical help is available over the phone at no cost and a MIX support conference provides on-line help. MIX "hosts" are assigned to new users to help introduce them to the electronic community. Conference moderators serve as on-line experts in a range of different fields. There are on-going discussions of curricular topics in the professional conferences. News conferences and a print newsletter help share ideas across the different user groups.

Teachers pay a yearly fee that helps to support the conference structure. Access to the network varies according to geographic distances. Users outside Minnesota usually pay the Tymnet or phone charges for accessing the MIX mainframe.

KIDS NETWORK provided a curricular unit with a networking component that was designed into the software package. All participants were required to use the same equipment, which in some cases was provided as a means of minimizing technical difficulties. There was on-line help and the project staff at TERC provided continual guidance in the development of the project. Teachers were provided with excellent written materials which explained each of the procedures in the project.

The major goal of the work on the network was to evaluate the curriculum materials. The science units will eventually be marketed as packages including curriculum guides, laboratory materials, and telecommunications.

Summary of Coordination: The LDLN, MIX and the Kids Network each had economic resources for providing coordination and support of the electronic community. FrEdMail did not have a central location or funding from which to provide for the same level of support services for the development, implementation and evaluation of telecommunication ideas offered by these other networks. The FrEdMail community has worked extremely hard to find ways to provide some of these services. Members of the network have provided excellent workshops and projects, but the time and resources are not available to provide the type of support systems that are a necessary part of any networking community. The systems operators of each board are under enormous pressure to support all aspects of telecommunication from training teachers to designing curriculum.

SUMMARY OF PARTICIPANT STRUCTURES ANALYSIS

The participant structures of the four networks suggest two different models for network structure. MIX and FrEdMail use an open conference group organization and LDLN and Kids Network employ a task-force group organization. Cross cutting this organizational model is centralized and decentralized control of the task. This provides the following classification scheme for the four networks.

	Conference Structure	Task Force Structure
Centralized Task	MIX	Kids Network
Decentralized Task	FrEdMail	LDLN

Network Structure. CMS Free Education Mail and McGraw Hill's Information Exchange have created a conference format, an electronic arena where participants visit, exchange ideas and perhaps establish smaller task-oriented committees to work on identified problems. In both networks teachers are individuals who "drop in" or leave activities without much change in the structure. There is no way to know how many people are passively participating in a conference and there is no obligation to commit any fixed amount of time to the networking activities. The conference structure encourages online "visits" by teachers or students to a range of activities with no or little response obligations. This freedom to explore requires teaches and students to be connected to the service for long periods of time using phone lines which often increase the cost.

The AT&T's Long Distance Learning Network and Kids Network organize the participants into smaller "task oriented" groups. The tasks are curriculum based projects that encourage cooperative learning across distances. The small groups operate for a specified period of time to accomplish established goals and each classroom is a vital part of the activity Teachers who join a Learning Circle on LDLN or a science cluster on Kids Network have a response obligation to the group they join. They agree to participate in a regular pattern for a fixed amount of time. The task-force model requires a great deal of pre-planning, coordination and curriculum development. This structure makes it efficient for students to work off-line and then exchange mail automatically with software designed to send and receive messages. In both these networks there is no hourly telephone or networking costs. These costs will be incorporated into a fixed charge for the curriculum unit (Kids Network) or the Learning Circle (LDLN).

Task Control. The decentralized organization of FrEdMail and LDLN gives teachers on the network a greater sense of control. Coupled with control comes a high level of personal responsibility for the organization and implementation of ideas. In FrEdMail almost all the responsibility for designing, implementing or interacting on network projects remains with the individual teachers. The high cost in teacher time is offset by an extremely low cost for participation. In LDLN there is an extensive support system for helping teachers create their networking projects. Teachers with common interests are grouped into Learning Circles. The small group of regular participants receive common curriculum materials with ideas for shared projects. Learning Circles work as a group to help each classroom sponsor a networking project. The matching of classrooms into Learning Circles, the development of curriculum materials and software, and the facilitation of the educational exchange increase the educational benefit to teachers and students. This increased service is reflected in a higher cost.

Mix and Kids Network maintain a centralized control of the network activity, but by very different means. The extensive online conference structure organized by the moderators on MIX creates the central locus of interaction. The moderators offer a particular networking activity open to any teachers who access the network. The scale of the activities will depend on the interest of the teachers and students who elect to participate. As any conference planner knows, the options must be diverse enough to provide something of interest to all participants, and each activity must be able to draw a large enough audience to make the participants feel comfortable.

In the Kids Network, the curriculum unit provides the centralized focus. The development of well defined curriculum units provide teachers with step by step procedures to follow as they engage in network interaction. The initial task in the science curriculum is to send specific data to a central location. The results are returned to all and unit clusters work together to interpret the results. The benefit of this program is the excellent materials and ideas provided by curriculum developers and scientists. The combination of large group data collection and task group formation is a very productive way to accomplish the science agenda. But the drawback is the teachers do not have as much freedom to explore their own ideas on long distance collaboration in scientific problem solving.

In sum, electronic education is likely to include more than a single model of educational networking. Designers of educational networks often seek ways to balance a need for structure, particularly for novices, with the desire for control that is often expressed by teachers with more experience. In a decentralized conference structure such as FrEdMail, many teachers are likely to be looking for more structure. In a centralized task-force organization such as Kids Network, teachers are more likely to want increased freedom to modify or change the structure.

In making policy decisions about networking models, it will important to analyze carefully the strengths and weaknesses of each of the models described as well as the needs of the community to be served by the network.

CONCLUSION

The rapid development of personal computers surprised most educators. They found computers, without good quality educational software, quickly ushered into classrooms with the expectations that these machines would revolutionize learning. Research documenting this introduction found that the technology in the hands of teachers struggling to learn to use it resulted in little change in students' skill (Mehan, Riel & Moll 1985). Teachers who had mastered the technology and developed the ability to selectively implement quality programs did have students who showed these predicted changes. The technology alone did not change learning patterns.

Since that time, a large number of educators have taken a forward look, examining each new innovation in technology and exploring possible classroom applications. The development of the educational networks described in this paper represents the collective efforts of educators to find the most productive and cost-effective way of utilizing telecommunication in the classrooms. These early efforts will help to establish new links between schools in distant locations and between schools and other sectors of the society. These innovative educators need the support and recognition of the community as they continue their exploration of the frontiers of the information age. Their work will provide the connections to the future.

Abstract

Computer networking technology allows for new forms of communication and with it new educational settings that extend across time and space. How the educational setting is organized and what learning takes place over this relatively new medium is the focus of this paper. Participant Structures used in the past to compare face-to-face educational settings are extended in this paper to examine the organization of four large scale educational projects involving telecommunications: McGraw Hill's Information Exchange, AT&T's Long Distance Learning Network and the National Geographic Kids Network. Two general models of educational network organization are described, a conference structure and a task-force committee structure. This organizational dimension is cross-cut by the issue of centralized vs decentralized control of the task. The discussion examines the relative strengths and weaknesses of each approach .

REFERENCES

Au, K. H. (1980). On participation structures in reading lessons. *Anthropology and Education Quarterly XI, 2*:91-115.

Cohen, M. & Riel, M. (1988). The effect of distance audience on students' writing. *American Educational Research Journal* (in press).

Florio, S. (1978) Learning how to go to school. Cambridge, Mass.: Unpublished PhD Dissertations, Harvard University, 1978

Levin, J., Kim, H., & Riel, M. (1988). Instructional interactions on electronic message networks. Paper presented at the annual Meeting of the American Educational Research Association, New Orleans.

Levin, J. A., Riel, M. M., Miyake, N., & Cohen, M. (1987). Education on the electronic frontier: Teleapprentices in globally distributed educational contexts. *Contemporary Educational Psychology 12,* 254-260 .

Mehan, H., (1979) *Learning Lessons.* Cambridge, MA: Harvard University Press.

Mehan, H., Riel, M. & Moll, L. (1985) *Computers in classrooms: A quasi-experiment in guided change* . Final Report to the National Institute of Education. La Jolla, CA: Interactive Technology Laboratory,.

Moll L. & Diaz, E. (in press) Bilingual communication and reading: The importance of Spanish in learning to read in English. *Elementary School Journal* .

Newman, D., (1986). Local and long distance computer networking for science classrooms. Paper presented at the American Educational Research Associations Meetings, San Francisco.

Phillips, S. (1972). *Participant structures and communicative competence.* In C. Cazden et al. (Eds.), Functions of language in the classroom. New York: Teachers College Press.

Phillips, S. (1984). The invisible culture: *Communication in classroom and community on the Warm Springs Indian Reservation.* New York: Longmans.

Riel, M. M. (1985). The Computer Chronicles Newswire: A functional learning environment for acquiring literacy skills. *Journal of Educational Computing Research, 1* (3), 317-337.

Riel, M. , & Levin, J. (1985) Educational electronic networks: How they work (and don't work). Paper presented at the American Educational Research Association Meetings, Chicago.

Waugh, M., Miyake, N., Levin, J., & Cohen, M., (1988) Problem solving interactions on electronic networks. Paper presented at the American Educational Research Association Meetings, New Orleans.

NETWORK PROJECT ADDRESSES

CMS Free Education Mail Service
Al Rogers
FrEdMail Project
San Diego County Office of Education
6401 Linda Vista Road
San Diego, CA 92111
Phone (619) 292-3639

McGraw Hill Information Exchange
Griff Wigley
9855 West 78th Street
Eden Prairie, MN 55344
Phone (800) 622-6310

AT&T Long Distance Learning Network
Valerie Sarris, Project Director
P. O. Box 716
Basking Ridge, NJ 07920-0716
Phone 1-800 -367-7225

National Geographic Kids Network
Robert Tinker or Cecilia Lenk
Technical Education Research Center
1696 Massachusetts Ave.
Cambridge, MA 02138
Phone (617) 547-0430

KEYS TO SUCCESSFUL NETWORKING on FrEdMail
FREE EDUCATIONAL MAIL NETWORKING

Al Rogers, San Diego County Office of Education, U.S.A.

The use of telecommunications in the classroom is a double-edged sword. For some teachers, this powerful technology expands the horizons of their classroom, flinging open the doors to real audiences and exciting interactive activities from exotic locations around the country and the world. These teachers know its capacity to motivate students and involve them in productive learning experiences.

Many other teachers, however, fail to realize this potential power. For every successful long-distance learning experience you hear about, you are bound to hear others testify, "I tried that, and it didn't work."

Articles and conference presentations are often guilty of at least a measure of hyperbole. The author or presenter is probably one who has had successful telecommunications experiences. The presentation is filled with glowing reports of life-changing on-line communications with distant colleagues, and how these experiences improved their classes. It is easy to be beguiled with such glowing evangelistic accounts. Yet many novices are often frustrated, discouraged, and disillusioned with the actual use of this "powerful, exciting" technology.

Much of this frustration is due to the learning curve imposed by the current state of technology in the classroom. There are still a myriad of technical obstacles to overcome in preparing to use computers, modems, and phone lines in meaningful ways in the classroom.

A more damaging source of frustration, however, has less to do with the technology itself, but more with the ways teachers think telecommunications technology ought to work, and what they expect from it.

Most computer using teachers expect instant results as they implement technology: plug the computer in, boot the word processor, and begin writing. Plug the printer in, and begin printing. Plug the modem in and dial an information service.

This experience with instant feedback leads a novice modem user to visions of a vast sea of hungry potential correspondents ready to consort with an eager newcomer. This vision motivates the novice to bravely slug through the swamp of technical obstacles in order to finally get online for the first time. Once online, the typical newcomer proudly throws out the first hook, announcing his or her presence and requesting a "computer pal," confidently expecting to snag an interesting and exotic correspondent.

Here is a typical new-user messages that came across the FrEdMail Network recently

Keys to Successful Networking on FrEdMail

```
To:   &IDEAS@OCNSIDE
From: &IDEAS@OAKSCHL%MIDWEST
Sent: Feb 15, 1989,  8:37 AM
Rcvd: Feb 16, 1989,  1:12 AM
Subj: Pen Pals
From: SDSU!SDCOE!OAKSCHL!WSMITH

My class and I are looking for another class to be pen pals with.  We
have 29 students in our class, 14 boys and 15 girls.  We are looking
forward to hearing from you.

William Smith, Highland, MI
```

This optimistic teacher is probably bound for disappointment. Teachers like this, trained by their prior use of technology to expect easy and instant response, and stoked by a glowing article or enthusiastic conference speaker, often sit back and wait for their imagined hungry cohorts in exotic places to answer their call for collaboration. When, two weeks later, they have not received even one reply, they are understandably disappointed in the "promise" of this technology.

These teachers haven't yet realized that installing their modems, learning their terminal software, and getting connected online are simply the preliminary and easiest parts of their task. Having dealt with these technological components, they are now ready to embark on a much different quest. At this stage of their journey, they must depend on other people to participate with them in an interactive project. And, unlike their fairly predictable experience with technology, this new social realm is vastly unpredictable and even sometimes temperamental.

Fortunately, we on the FrEdMail Network have evolved a number of guidelines and principles which have led to many successful collaborative projects involving hundreds of classrooms and thousands of students. Like many aspects of successful teaching, we have found that planning is the key to success.

The first rule of successful online learning activities is to avoid this kind of stereotypical pen pal activity. Jim Levin, a pioneer researcher in electronic networking at the University of Illinois, has documented on FrEdMail and elsewhere the reasons why pen pals are not effective for eliciting high quality networking activity. (Levin, Rogers, Waugh, Smith, "Observations on Electronic Networks", The Computing Teacher, 16(8), 17-19.) While the unstructured format of pen pal activities can result in some positive benefits for individual students, it is often disappointing as a whole class activity. Even if our optimistic novice above succeeds in making contact with a correspondent, there is a high likelihood of an unrewarding experience.

How then does a teacher take advantage of the much-vaunted "promise" of telecommunications technology in the classroom? The guidelines presented below have been validated in numerous highly successful classroom based projects on the FrEdMail Network. These guidelines, along with the sample "Call for Collaboration" following, will help guide you through a successful online learning experience with your students.

KEYS TO SUCCESSFUL TELECOMMUNICATIONS PROJECTS

1. Design a project with specific goals, specific tasks, and specific outcomes. The more specific, the better; the more closely aligned with traditional instructional objectives, the better.

2. Set specific beginning and ending dates for your project, and set precise deadlines for participant responses. Then, make a time line and provide lots of lead time to announce your project. Teachers feel more comfortable participating in projects that have a definite goal and an ending date. Experience shows that peak use on an educational network is geared to traditional cycles of the school calendar. October through December, February through May, and July (with summer school) are very busy times on the network. However, most of the successful networking activities were planned and announcements posted six to eight weeks before the actual projects began. You'll also find that sometimes, you'll need to advertise for participants several times, and thus the more lead time the better.

   Phased deadlines establish a sense of accountability to the other participants in the project, and makes it easier to secure follow through. Often, where the teacher may not be inclined to complete the project, if the students have been apprised of the deadlines they will often hold their own teachers accountable to complete the project.

3. If possible try your project out with a close colleague first, on a small scale. This can help you overcome both technical problems as well as problems with the basic project design. You will find that having a sympathetic colleague available to discuss and solve problems will be a big help. You'll also find that in some of your early networking experiences, you may have to mail the disks containing student writing rather than using this much vaunted new technology.

4. Request collaborators by posting messages on electronic bulletin boards, and by sending out flyers if possible. Once you have designed your project, create a formal "call for collaboration" to post on the network of your choice. An example call for collaboration is included in this article. By preparing this call off line with your word processor and then uploading it, you'll be able to conveniently repeat the announcement as often as needed until you get the collaborators you need. If you happen to have the addresses of people you would like to collaborate with, send them a hard copy of your request, as they may not be actively using the service during the time your calls went out.

5. Give specific information about your project:
   - Goals and objectives of the project
   - Your location
   - grade levels desired
   - contact person
   - Time line and deadlines
   - how many responses you would like
   - what you will do with the responses

6. Provide examples of the kinds of writing or data collection which students will submit. This is important to the success of the project.

7. Find responsible students and train them to be part of your project. You're probably already doing this if you are using technology in the classroom. This will be a big time saver.

8. At the conclusion of the project, follow through on sharing the results of the project with all participants. If you publish any student writing, send a hard copy to all who participated. Have your students collaborate on writing up a summary of the project, describing it, what they did, what they learned, and what changes they would make in the project. Post that message on the network for all to see (not just the project participants). Finally, have your students send a thank you message to all participants. You might also want to send a hard-copy of your summary and thank you to the principal of each school which participated. This can be an effective way to reinforce one another in our ongoing efforts to educate others and validate use of this technology.

On the FrEdMail Network, a general format for a "Call for Collaboration" has evolved, which incorporates these guidelines. Here is the Call for Collaboration of a highly successful project recently conducted on FrEdMail.

```
To:   &IDEAS@OCNSIDE
From: &IDEAS@SDSU
Sent: Mar 1, 1989, 11:28 AM
Rcvd: Mar 2, 1989, 10:26 AM
Subj: US GEOGRAPHY GAME
From: SDSU!BLADEN!WSALEM!TCLAUSET

GEOGRAPHY GAME
*******************
TEACHER GUIDELINES
*******************
     The object of this game is to try to learn where the TEACHER
PAL classrooms are located; and, learn a little United States
geography  at the same time.  The first part of the activity requires
that each  classroom fill out the "Geography Game Questionnaire" in
this file and  EMail it back to the project coordinator
(TCLAUSET@WSALEM) by Friday,  Feb. 10th.  The next week you will
receive a file which will include the  names of city/state locations
of all the classrooms participating in the TEACHER PAL PROJECT.  In
addition this file will contain descriptions of  these locations.
Your students must help you try to figure out which description goes
with which city/state listing.  The winning person or  class is the
one who correctly matches up ALL of the city/state locations  with
their correct descriptions.
PROJECT TIMELINE:
----------------
1. Guidelines mailed out:                     - Monday, Jan. 30th
2. Your class's description of your city
   needs to be mailed in to  TCLAUSET by:     - Friday, Feb. 10th
3. Geography game locations &  descriptions
   will be put into EMail by:                 - Thurs, Feb. 16th
4. You have until this date to work on the
   game with your class.  You must mail in
   your class's answers  by:                  - Tuesday, Feb 28th
5. Game results will be mailed out:           - Thurs, March 9th
```

FILLING OUT THE DESCRIPTION FOR YOUR CITY:

You might want to start with a whole-class discussion of the game and go over the identifying characteristics of the 8 description items. Discuss latitudes, time zones, land forms, points of interest, tourist attractions, state capitals, and nearby rivers as needed. Divide your class into groups of two or three and give them each a question. Have them do a little research in the library or with local maps to find the answer to their question. Come back together in a whole-class discussion and elicit the answers to each group's question. Have a student in the class act as a 'secretary' to compile the answers.

Type up the 8 answers and EMail them to TCLAUSET (....SDSU!BLADEN!WSALEM!TCLAUSET) by Friday, Feb. 10th. The following is an example of how you might fill out the list of 8 questions for a sample city:

City:	Lancaster, Pennsylvania
1. Latitude:	40 degrees
2. Time Zone:	Eastern
3. Winter:	Cold & snowy!-High today:40 / Low: 20 Dress: Heavy coats, boots, gloves, hat
4. Closest River:	Susquehanna River/ gently rolling farmland
5. Tourist Attractions:	Amish farms
6. Population:	386,600
7. Direction from capital:	Southeast
8. Famous For:	home of former president, James Buchanan; location of Franklin & Marshall College

PLAYING THE GAME·

By Thursday, Feb. 16th a file containing the locations of each of the classrooms in the TEACHER PAL project as well as an equal number of location descriptions will be put into the mail at WSALEM. You may want to gather a few materials for the class so that students can break up into small groups to begin the process of matching locations up with descriptions. (Large United States map showing time zones & latitudes, set of encyclopedias for individual state maps, AAA road maps, Rand McNally Road Atlas, Almanac, etc.) Run off enough copies of the city/state locations to give one to each child in your class. Print out the descriptions, divide your class up into 4 or 5 groups and give each group an equal number of the descriptions. You might want to set aside two or three 20-30 min. "Research Periods" for the groups to try to match up their descriptions with the city/state locations.

When each group has done the best job they can on the match ups, type up a list, with each city/state listed with the number which matches its correct description and EMail it to TCLAUSET by Thursday, Feb. 23rd.

WHO WINS THE GAME?

Within a week or two of the conclusion of the game, the results will be mailed out to all participants. The winning classroom(s) will be the one(s) which is/are able to match the most locations with their correct descriptions.

Keys to Successful Networking on FrEdMail

GEOGRAPHY GAME QUESTIONNAIRE

****

1. What is the latitude of your city?
2. In which time zone are you located?
3. Describe the winter season in your area. Include temperatures, precipitation, and seasonal dress.
4. List any prominent land forms in your area and name the closest river. How far are you from this river?
5. Name the points of interest or tourist attractions in your area.
6. What is the population of your city?
7. In what direction is your city from the state capital?
8. For whom or for what is your city famous?

Networking activities can encompass a wide variety of project ideas, especially projects in which students can collect data and information for use by other participants on the network.

As teachers gain skill and comfort with networking technology, and as networks become more accessible to both teachers and students, classroom telecommunications technologies will grow in importance as a tool for involving students in interactive projects which will motivate and interest them to improve their skills and learn about the world around them.

Questions & Answers about FrEdMail

What is the FrEdMail Network?

FrEdMail stands for "Free Educational Electronic Mail Network." It is a distributed electronic bulletin board network consisting of over ninety locally owned and operated systems across the country. During most of every day, each board operates as a stand-alone electronic bulletin board serving local callers. In addition, however, each board is linked by normal voice-grade telephone lines to other systems in the network. In the middle of the night, each board in the network comes alive and dials the boards with which it is linked, exchanging electronic mail and network-wide bulletins. In this fashion, users on one local board are able to read bulletins from educators all over the country, and to send EMail to users on other systems located elsewhere.

What software and computers operate on the Network?

Users access the FrEdMail Network with a great variety of computer and software types. It uses a standard 8 bit, no parity, one stop bit ASCII protocol. It supports both ASCII and XModem file exchanges.

Originally, all FrEdMail hosts were Apple computers running the CMS (Computer Mail System) software. An ongoing goal has been to integrate other software and computer types as host systems, however. Progress has been made in establishing links with GBBS (another Apple-based BBS program); with UNIX Usenet; and with Fidonet (MS-DOS).

Most of the nodes continue to operate with CMS software on Apple computers. This software is available exclusively for $50.00 from CUE Softswap, a non-profit professional organization of Computer Using Educators in California.

Why do you use Apple computers instead of "real" computers?

Many teachers who are interested in telecommunications are unable to access suitable telecommunications services for a variety of reasons. However, Apples are the most ubiquitous computers in California education. Every school has access to one, and thousands of teachers have one in their home. Many of our local system operators are teachers and districts who found that they only realistic way they could experiment with telecommunications in their classrooms was to use their available Apple computer to become their own local telecommunications provider, and set up their own local bulletin board. The CMS FrEdMail software has made this possible.

Keys to Successful Networking on FrEdMail

Furthermore, the CMS FrEdMail bulletin board software was designed specifically with the classroom teacher in mind. It runs on an Apple computer, and it addresses the issue of classroom management and deals with the need to send and receive large quantities of student writing in simple and timely fashions. As a model of what local classroom access software should accomplish, the CMS FrEdMail software has demonstrated a particular and unique advantage over other services. Finally, having the bulletin board software operate on an Apple computer allows each school to achieve the ultimate of local control over their own community bulletin board service, able to serve the unique local needs of their students, parents, and community without reference to a third party telecommunications provider. Several of the boards are actually operated by student sysops under teacher direction. The Apple computer allows this to happen in many schools which may not otherwise have access to telecommunications experiences . This availability makes telecommunications truly a populist experience.

It is not the intention, however, that the FrEdMail Network should remain exclusively hosted on Apple computers. A long range goal of the network developers has been to incorporate other networking solutions into the FrEdMail system so that end users have a variety of choices from which to select. Certain FrEdMail nodes, for instance, have exceeded the capacity of their systems to serve their local clients and are in need of a multi-line system.

What is the purpose of the FrEdMail Network?

FrEdMail represents "training wheels" for the soon-coming telecommunications using Information Age Revolution we see growing all around us. It is designed to provide the kinds of activities and purposes which will at one and the same time entice teachers and students to learn about the uses of telecommunications as well as provide stimulating, interesting, and productive activities to promote student learning.

On both counts, FrEdMail has had great deal of success. Because FrEdMail is free to the caller, thousands of teachers have had the opportunity to experiment with telecommunications and freely explore this new and different form of electronic communications. And the interactive, collaborative learning projects conducted among the many classes on the network have resulted in consistently positive results in increased motivation, enthusiasm, and effort on the part of students to improve their written communications and other skills.

Who operates the various nodes on the network?

The various bulletin boards in the FrEdMail Network are operated by a wide variety of individuals and institutions. Some boards are supported by the district offices involved (FULLRTN, NEWPORT, SDUSD, CVUSD, etc.). Some operated in County Offices of Education (SNMTEO, SDCOE, OCDE). Some are operated by teachers at individual schools (OCNSIDE, LINC, LINCOLN). Some are operated at universities (SDSU, CSUSB, PEPPER). The North Carolina network is subsidized the the North Carolina Department of Education. The WYOMING node operates at the Wyoming State Department of Education. Some nodes operate in district offices; some in school offices; some in school classrooms; and a few have been operated in teachers' homes.

Some nodes serve particular projects. NEWPORT hosts the University of California, Irving's "New Teacher Support Network" which seeks to provide a focus for support activities for new teachers in Saddleback and Irvine School Districts in Orange County. OCDE serves the needs of the Orange County Department of Education and UCI's drug abuse prevention program as a means for disseminating curriculum and information on drug and alcohol abuse.

In every case, there is an individual who has "adopted" the challenge of introducing telecommunications concepts to their colleagues and constituents and keeps their own node functioning and connected to the network.

Who pays the costs associated with using the network?

"FrEd" means "Free Educational." This means that there are no access, subscription, or online costs to the end user.

Instead, all costs associated with the operation of the network are in various ways borne by the individual board operators on a shared, cooperative basis.

Long distance calls are kept to the minimum costs through the use of standard, voice grade phone lines. Network connections take place automatically in the middle of the night, between the hours of midnight and 4:00 a.m. at 1200 or 2400 baud. Typical exchanges take five to eleven minutes. Some nodes have budgets to initiate (and therefore pay for) the long distance calls. Many nodes which have no budgets receive a subsidy in the form of receiving calls and thereby being able to participate in networking activities.

The major cost of the network, however, is the investments made by the dedication and free services of the various sysops and project coordinators who work hard and diligently to keep the network operating in productive and reliable ways. These numerous individuals provide value added benefits which enrich the network for all concerned.

In the past, some grant monies have been available from the state of California Educational Technology Committee to improve the operation of the network, publish a network newsletter, and to provide personnel for technical support. However, in the absence of this support, little progress is currently being made in these areas.

What are the advantages of a distributed, locally owned network

This distributed ownership brings a number of advantages. Each school and district is able to tailor local content to their unique local needs. Some districts use the boards for both instructional and administrative purposes. Other sites promote extensive use by students both at school and at home. The flexibility of local control is perceived as a major advantage.

Another significant advantage to the network is the commitment brought to the network by each site. Each local site has a vested interest in promoting the service to its local constituents, and most of them are proactive in recruiting participants and training teachers. This brings a great deal of vigor and involvement to the collective effort which would be difficult to obtain through a proprietary commercial system.

Finally, local ownership usually means a subsidized service which allows free access to the end user. No other system encourages, invites, and allows teachers and students to freely use the service. Commercial systems are fine for teachers and administrators, but they do not allow students to have direct experiences at any but the most cursory level.

What types of activities take place on the network?

In fulfilling the goal of introducing the benefits of the telecommunications age to teachers and students, the FrEdMail Network has developed a context which provide meaningful and productive activities and services to both teachers and students.

Activities on the network are designed around current principles of teaching methodology. They are curriculum based, and are designed to involve students in learning activities, in all content areas, which include collaboration and interaction with students at other sites. These real connections, which provide real audiences of their peers, serve to motivate students at both ends to do their best work.

A wide variety of learning projects have been conducted by thousands of students, in every content area, and at every grade level K-12. Several surveys of teacher participants over the past three years have consistently revealed the positive impact on students' motivation and desire to improve their written communication skills.

What are some exemplary network activities?

- The University of California operates their "New Teacher Support Network" on FrEdMail. This is an online, electronic community of first year teachers in several Orange County school districts who use FrEdMail as a professional support group. Several experienced teachers serve as mentors to answer questions, provide assistance, and to encourage.... all online.
- The Orange County Department of Education uses FrEdMail to publish lesson plans and other information on substance abuse to twenty eight school districts in the county. This information will be eventually be available to any FrEdMail node that would like to take advantage of it.
- "HANDERS" is a node in San Diego operated by the San Diego Unified School District's deaf and hard of hearing program. At the particular request of this program, the FrEdMail software answers the phone at 110 baud so that deaf citizens with TDD's can access the service as well as other citizens. We expect to have some collaborative projects this year between deaf students and "normal" students.

Keys to Successful Networking on FrEdMail

FrEdMail Network Map May 01, 1989

```
========================================================================
        PDL    CAPRI     VLYCNTR--ESCUSD--POWAY
            \  /                     |
 OCNKNOL--ENCINIT----------------OCNSIDE
            /  \                   / | \ \
    LACOSTA    CENTRAL            /  |  \ LINC
                                 /   |   \
                         SANMARC     |   PACIFIC
                                     |
                       BREVARD       |
                         |           |
              HRTFRD-NWHAVEN--\      |
                         |      \    |
                       CUMBER    \   |
                                  \  |
    ARGO                           | |
      |                  WYOMING   | |                      BELL
   [NJERSEY]                    \ \ |  CALPOLY               |
    NJMCSIP  CSUSB                \ \|  /           SYSIDRO   | CMS
           \ /                 [SANDIEGO]-CHTROAK           \ | /
  PHILLY--SDSU------------------- SDCOE -------------------SDUSD--CVUSD
          /|\                    / /||| \                 / /| \
         / | \   AMTS        USIU | |||\ ELCNTR     SOWEST / | ERICSON
        /  |  \    |              | ||| \                 /  |
  [LAUSD]  |   PEPPER       OAKSCHL |||  LAKESID    SANTEE   |
  NORWOOD  |                   |    |||                      |
    /  \   |      ESC13IL    TROY   |||                     HOLMES
LANAI CAG  |             \         / ||
           |             [ILLINOIS]  ||
             \   HOOVER1---UIUCED    | \_____________________ HARNETT
              \                      |                      \      |
               \                     |                WILSON  \ ANSON
                |    ANAHEIM         |                      \  |  /
                |   /                |      COLFAX     SWAIN \ | / CATAWBA
   CNUSD  SHHS  |  / LINCOLN         |           |          \ \|/    /
       |      \ | / /                |     COOK--WSALEM--[NCAROLINA]
       |       \|/ /                 |           |           BLADEN--HYDE
      OMSD-[ORANGECO]-NEWPORT        |     DAVIDSN          / /|\
       |     FULLRTN                 |                 NHAMP / | MOORE
       |     /    \                  |                      /  |
 DESERT  ORNGUSD   OCDE       SLHS   |  COLS          NCSDPI PERSON--DURHAM
                                  \  |  /                   /  |   \
                           SNMATEO \ | / CTW           PSHS  WAKE MICRO5
                                  \ \|/ /
         UUNET GATEWAY==UNIBASE--[NORCAL]----[NEWYORK]
        UNITEX GATEWAY=/ /       SNLNDRO   \  NASSAU
       FIDONET GATEWAY==/       / / /|\ \ \ \
                            SIRC / / | \ \ \ MT.CITY
                                / /  |  \ \ \
                         SECLLNL /   |   \ \ MADERA
                                /    |    \ \
                          SACTO  SANJOSE   \ NAPAVAL
                                     |      \
                                  CHALK      OAKLAND
```

LANGUAGE ATTITUDE CHANGE OF STUDENTS IN U.S. UPPER ELEMENTARY BILINGUAL PROGRAM CLASSROOMS PARTICIPATING IN COMPUTER-BASED EXCHANGES WITH PUERTO RICAN SISTER CLASSES

Dennis Sayers, Brown University, U.S.A.

This presentation summarizes three research studies, one of which is still in progress, conducted between 1987 and 1989. These studies have examined the change in language attitudes of students in 6 upper elementary classes in a Spanish-English bilingual program in New England. Each class had approximately 25 students, all of Puerto Rican heritage and all of whom speak Spanish at home. Approximately one-quarter of the students were "new arrivals" dominant in Spanish, and three-quarters of the students were more proficient in English, mostly born in New Haven, Connecticut. The students regularly exchanged written texts via computer with different "sister classes" in Puerto Rico. The classes are part of an international computer writing network named De Orilla a Orilla (From Shore to Shore) which since 1985 has used telecommunications to link bilingual student writers in Argentina, French-speaking Canada, Puerto Rico, Mexico and the United States. The studies reviewed all investigated the functioning of student-directed Editorial Boards in the production of bilingual newsletters produced jointly by sister class partnerships.

The Activity Structure under Study: Student Journalism

International writing networks employing telecommunications are so new in today's schools that we often have no choice but to fall back upon familiar metaphors as we seek to understand this innovation. The typical reaction of a puzzled teacher when he or she first tries to envision the educational potential of these networks goes something like this: "Oh, yeah...I get it. You mean pen-pals over the computer." Indeed, much of the initial writing exchanged between students falls squarely into the pen-pal genre. Letters are quickly composed at computers and immediately sent via modems to distant classes. Yet teachers and researchers have noted that the early excitement of writing letters to "computer pen-pals" soon becomes boring to students; moreover, pen-pal letters offer young writers few opportunities for the development of more complex composition skills such as revision (Daiute, 1985; Riel, 1983).

Using computers as a medium of communication, rather than trying to program the machines to teach students, or getting the students to program the machines, is a recent concept. The earliest student writing network which utilized computers extensively was established by the Interactive Technology Laboratory at the University of California-San Diego (UCSD) in 1983. One of the prinicipal governing images for the exchange of writings in the UCSD network was student journalism (Levin, Riel, Boruta & Rowe, 1984; Rosa & Moll, 1985). The model of the computer as "electronic mail carrier" delivering penpal letters was replaced by that of the computer as "classroom teletype." Student journalism is a particularly effective governing image because of the clear definition of roles it provides young writers: they are "reporters" when they write articles for local newsletters, "editors" while revising and polishing articles for publication, and "correspondents" when they send the best writings to other classes (Mehan, Moll & Riel, 1985; Riel, 1985).

Clearly, this model advances a concept of "local" journalism, sprinkled with articles from foreign correspondents. Local student-editors give feedback only to fellow classmate-reporters. Articles received from "foreign correspondents" are selected and edited locally according to the editorial policy of that classroom's newspaper. In other words, peer feedback for young authors is limited to that provided by fellow students within the context of each classroom. Although the computer writing network has the potential for providing peer feedback on a draft from many distant readers, this promise is rarely realized. Margaret Riel (personal communication, 1987) hypothesizes that this is due to the difficulty of coordinating timely feedback between several classes in a computer writing network.

"De Orilla a Orilla" uses "Sister Classes" to respond to this challenge (Cummins, 1986; Sayers, 1987; Sayers & Brown, 1987). Sister Classes are partnerships between teachers in which common curricular activities are jointly designed which are implemented in both classes. The one-on-one structure of this network offers some unique possibilities for examining alternatives to the local journalism model. As we shall see, the pairing of sister classes also provides the two teachers with a supportive context for reflecting upon, challenging and redefining their classroom strategies for writing instruction. Thus, a few words about "De Orilla a Orilla" should help establish a context for a later discussion of joint Editorial Boards between Sister Classes.

Project ORILLAS: An International Sister Class Network

"De Orilla a Orilla" is the multilingual "special interest group" of a large and growing confederation of teachers on the MCI-Mail Computer Network. Project Orillas began by linking up classes in Mexico and Puerto Rico with Latino students in the United States. The goal was to improve students' educational achievements --especially writing skills-- both in the United States where Spanish is a minority language and in Mexico and Puerto Rico, where it is the dominant or majority language. In November of 1985 Dennis Sayers worked with Andres Menendez of the Laboratory High School at the University of Puerto Rico and Enid Figueroa of Project CEMI at the University of Turabo to link students in New England bilingual programs with their Puerto Rican counterparts. By the spring of 1986 Kristin Brown had involved classes in California and Mexico. The Orillas network was growing quickly.

Now Orillas includes many pairs of Sister Classes as more bilingual and second language teachers in the United States and educators in other nations participate, including 60 schools in Argentina, French-speaking Canada, Mexico, Puerto Rico. So far Sister Classes have most often been partnerships between

- two U.S. bilingual classes,
- a bilingual class in the US and a class from the "mother" culture, and
- between students who study Spanish as a foreign language and students from the "target" culture.

Sometimes these typical patterns are broken, however. One fascinating exchange is going on between deaf high school students in San Diego who are exchanging video tapes using American Sign Language with another secondary class in Rio Piedras, who respond in written Spanish over the computer network.

Communication is accomplished primarily through writing. Word processors are used to plan, compose, revise and edit texts, and telecommunications to send the writings quickly to faraway readers. Students connect the computer to a phone line with a device called a modem and call a local number that connects them to the MCI-Mail computer in Minneapolis, where they can (a) leave their electronic messages for distant readers, and (b) read all the messages that have accumulated for them since their last call.

Using this technology, students write much more than electronic pen-pal letters. The most successful projects have been those which have a life of their own away from the computer, and can be amplified by the participation of the sister class. Teachers discover myriad ways to exploit the learning potential of computer writing networks, some of which employ other media and the "old-fashioned" postal service. The steady stream of student writings are often supplemented with culture packets -- "time capsule" packages including photos, maps, items of local interest and videotapes. Teachers have found that both the number and quality of texts shared over the computer increases as culture packets are regularly exchanged between sister classes.

Pedagogical theory

The growing sophistication of teachers in ORILLAS is not limited to developing expertise with a variety of computer systems. They are also interested in forging a pedagogical theory to guide their classroom work with computer writing networks. In this regard, the writings of an educator from another continent and another era have taken on a renewed significance. Celestin Freinet founded the Modern School Network in a small town in the French Alps in 1924. Celestin Freinet's ground-breaking philosophy of teaching is far from being out-dated (Sayers 1988). Advocates of his approach grew from a few teachers at a single school in the French Alps to a network of thousands of corresponding schools across Europe. Freinet remains a vital force in European education today. His writings have been translated into every major European language but one: English. Thus, he remains largely unknown in North America.

Freinet used the most advanced printing technologies of his time --the mimeograph machine and the movable type printing press-- in classrooms to help organize literacy learning around a clearly social and affective context. Central to Freinet's approach was the almost daily printing of pages for students' "life books". These were personal portfolios of children's writings in the form of separate printed sheets, eventually bound as a book at the end of the semester. Once they were comfortable with drafting, sharing, revising, printing and publishing page after page of their "life books", students then regularly exchanged their writings with a class of distant correspondents. These two phases, the organization of literacy skills development around print technology and the sharing of writing with student correspondents, are at the heart of Freinet's pedagogy.

The exchange of texts between faraway classes was not an after-thought in Freinet's method, but an integral, complementary part of an unfolding process of literacy development. In this way a writing network was formed which was tenaciously rooted in the personal and interpersonal worlds of students, their families and neighborhoods. Yet this network extended far beyond the school and community.

> The printed pages of his "life book" that the child has gathered are read by all his classmates, by his parents. He too finds himself in these pages whenever he re-reads them. Is it not profoundly human to make known our thoughts, to share them? Only under these conditions does it make sense to

> speak them, to write them. Later, the exchange of correspondence between classes will extend the horizon; the thoughts of the student go beyond the school and the family; other faraway students, other parents, other teachers will read them. Their value has suddenly increased a hundred-fold and their author's chest swells with pride. Having something to say, writing to be read, to be discussed, to be responded to critically, this is the grand motivation we should be seeking, and which is realized through classroom printing and the exchange of correspondence (Balesse & Freinet, p. 89).

The work of Celestin Freinet may be seen as an attempt to employ the educational technology of his day to create a wide-ranging social context for critical thinking. Teachers in ORILLAS have found Freinet's writings a useful model for guiding their classroom practice.

Three studies

Joint Editorial Boards involving minority language students in sister class partnerships were first studied (Sayers 1987 & 1988) as a vehicle to promote the simultaneous development of literacy in both the home and second languages. In the initial research, the Editorial Board exchanges were between a 5th grade bilingual program class in New Haven and another bilingual class of the same grade level in San Diego. All the students in the New Haven class were from Puerto Rican families who spoke Spanish at home, and for most of these students the dominant language for school activities was English. The San Diego students were in a "two-way" bilingual program: half the students were Anglos whose parents had placed them in the bilingual program to learn a second language, and the rest of the students were from Mexican-American families who spoke Spanish at home, as did their New Haven counterparts, and the majority of these students also felt more comfortable interacting in English during school hours.

Students in both classes were nominated for the Joint Editorial Boards by their teachers, with no regard for their relative proficiency in English and Spanish. Not surprisingly, the amount of written communication in Spanish which resulted from the exchanges between these particular sister classes was minimal; there was little reason to tap the relatively weak, emerging Spanish skills of the Anglo students in San Diego or the decaying first language skills of the English-dominant minority language students in both sister classes if English was the more easily employed "coin of the realm".

For the second study, the decision was made to investigate a sister class exchange with the same New Haven teacher, but this time teamed with a teacher from Puerto Rico. Moreover, in the New Haven classroom, all Spanish-dominant students were assigned to the Joint Editorial Board and matched in number by students nominated by the teacher. The initial negative attitudes of the English-dominant "majority" of these minority language students toward their Spanish-dominant classmates was revealed in direct commands ("Talk English!"), deprecatory comments ("I can't understand you when you talk that Spanish") and critical remarks made to this researcher ("I wish they wouldn't talk so fast"). Negative cultural attitudes were voiced by one New Haven-born English-dominant student when the topic of "personas ilustres puertorriquenos" (famous Puerto Rican historical figures) was raised: "What' she talkin' about? We don' got none of those 'round here." One of the major findings of the second study was that in the context of Editorial Board exchanges with a Puerto Rican sister class conducted entirely in Spanish, the "prestige" of the Spanish-dominant Editorial Board members increased, both in their own estimation and in that of their English-dominant peers. The Spanish-dominant students became "language experts" whose skills were much sought after by their English-dominant classmates.

In the most recent study of sister class partnerships begun in September 1988, four teachers in Connecticut and their colleagues in Puerto Rico planned and coordinated activities which involved all the students in both sister classes. While this data has only been analyzed preliminarily, the experimental design may be of interest for researchers in long-distance intercultural exchanges involving immigrant students.

In two of the New Haven classes, teachers and students planned joint activities with their Puerto Rican colleagues around several cultural events. In the remaining two classes, the students participated in a specific project with their Puerto Rican sister class which required interdependent activity between Spanish- and English-dominant children: the joint production of a fully bilingual newspaper, under the direction of Joint Editorial Boards comprised of a sub-group of students in both classes. Members of the Joint Editorial Board in the New Haven "experimental" classes include a) all Spanish-dominant students, and b) an equal number of English-dominant children.

Within each experimental and control class, students were identified as belonging to the Spanish language dominant group (SpLDG) or the English language dominant group (EngLDG) based on a teacher survey rating each student as of low, average or high proficiency in speaking, reading and writing skills, both in Spanish and English.

Research questions which guided the study are:

a. To what extent do students' attitudes toward speakers of Spanish and English change in the context of classroom activities which demand high levels of language skill in two languages?

b. Which is more predictive of change in students' language attitudes, the structured cooperative learning environment provided by Editorial Board interactions in the context of the production of an explicitly bilingual newspaper, or teacher-coordinated cultural exchanges with sister classes in Puerto Rico?

It was hypothesized that there would be evidence of change in language attitudes for both English- and Spanish-dominant students in the form of increased favorable evaluations toward Spanish speakers as a result of the sister class exchanges in all classrooms. It was further predicted that the degree of change would be greater for the classes employing the cooperative learning technique due to the greater opportunity provided for students to interact with Spanish-dominant classmates around specific cultural and linguistic issues. Thus, the dependent variable in this research is change in students' attitudes toward the use of Spanish and English, while the independent variable is a structured, cooperative learning context which requires frequent interaction between English- and Spanish-dominant students. Several pre- and posttest measures of language attitudes were given.

(1) A sorting task of classmates' photographs. This task seeks to assess changes in individual students' awareness of their classmates as language resources. Individual Polaroid photographs of all classmates are placed on a table in full view of the subject. The interviewer's questions are

designed to prompt the student to choose classmates as companions for various language- and culture-specific situational tasks, that is, contexts where one or another language is required to achieve a communication goal. For example, children are told: "Imagine you are going on a school trip to Puerto Rico for a week, but only 3 students can go with you. Who would you pick?" or "Suppose only four student reporters can interview the (English-speaking) principal for the school paper and you are one of them? Who would you pick to go with you?"

For each question, an appropriate choice of a potential colleague for each obligatory language context results in an increment to the student's score on this task; that is, choosing an English-dominant colleague to interview the English-speaking principal raises the score, while choosing a Spanish-dominant colleague neither raises nor lowers it.

(2) An inventory of cross-"language dominance group" respect for classmates. This task (following Weigal et al.) is designed to provide an index of each student's relative appreciation for his or her own language dominance group vs. the other language dominance group in the class. Using the pictures from the photo sorting task as "prompts", each student rates on a 3-point continua all of his or her classmates on these five personal attributes: (a) how hard-working they are, (b) how friendly they are, (c) how easy they are to work with, (d) how helpful they are to other students, and (e) how helpful they are to the teacher. For each attribute, a mean score is produced for students in his or her own LDG and the other LDG. The latter is subtracted from the former and a constant is added so that all values are positive. Then the five difference scores are summed to produce a comprehensive index score. Difference scores are used to counteract any tendency to produce consistently high or low ratings. In this manner, the midpoint of the range of possible index scores indicates that both groups are respected equally, while a higher score indicates greater respect for one's own language dominance group, and so on.

(3) A matched-guise, or listener evaluation task of Spanish and English speakers. Two guises are read onto an audiotape by a 12 year old bilingual Puerto Rican child unknown to any of the subjects. A tape is produced with guises in both possible orders, and versions are assigned to subjects randomly. Subjects listen to the tape in groups of not more than 5 students and respond on a test sheet to questions posed by an interviewer. #The interviewer prompts listeners to rate the first guise presented at three levels on (1) appropriateness for school, (2) correctness, (3) likelihood of achievement, and (4) the listener's "solidarity" or personal identification with the speaker. A score for each of the four categories and a separate mean score is computed for each student on the first guise. The procedure is repeated for the second guise.

(4) An interview on language attitudes. Students are asked a series of questions designed to prompt attitudes toward the appropriate use of Spanish and English, such as:

- What is Spanish (English) good for? Why?
- Where do you feel good talking in Spanish/English? Why?
- Have you ever felt bad about talking in Spanish/English? Why?

- I've heard that some children pretend they don't understand Spanish/English. What do you think about that?
- If you could be choose to grow up anywhere on Earth, where would that be? Why?
- When you are alone, which language do you think in? Why?
- If a child's parents are from Puerto Rico, and that child speaks English and no Spanish, is she Puerto Rican? Why?

A 2x2x2 factorial ANOVA strategy is being employed to analyze variation between two groups (experimental and control) for the two different classes on two repeated measures. Second and third ANOVAs will compare scores of Editorial/non-Editorial Board members and Spanish-dominant/English-dominant Board members. The small sample size and the lack of random assignment will not allow analyses of these latter ANOVAs for statistically significant results. However, focused qualitative observations on Editorial Board interactions for evidence of change in language attitude, when considered in conjunction with the quantitative analyses, should offer a further basis for supporting or for rejecting the research hypotheses on the dependent variable.

Change in students' language attitudes is predicted in the form of increased favorable evaluations toward Spanish speakers in all classrooms, with more positive change for those classes employing cooperative learning techniques due to increased opportunities provided for interaction with Spanish-dominant classmates. Research into language attitudes argues that minority language children begin schooling with a neutral attitude towards their own speech variety, and gradually come to value the dominant language variety more highly (Day 1982). The potential of this intervention to counteract these language attitudes is supported by investigations into studied cooperative, interdependent learning groups as a vehicle for producing favorable change in "cross-group" attitudes (Allport, 1954; Kagan, 1986; Slavin, 1979; Weigel, Wiser and Cook, 1975).

Conclusions

The goal of Project ORILLAS --for bilingual education and second language students in the United States as well as for their colleagues in other nations-- is to promote bilingual literacy by providing a motivated context for authentic writing. Computer networks can help by linking novice writers to a wide world of language learners. In fact, these networks keep alive the ties to the "mother culture", nourishing literacy for bilingual students. In addition, second language students benefit from the authentic contacts they establish with native speakers.

These networks offer teachers and researchers a literacy laboratory where traditional roles become fused. Both investigators and educators can build theories, test hypotheses and refine pedagogy around many controversial issues: the interaction of speaking and writing; the impact of audience awareness on text; and the simultaneous development of mother-tongue and second-language literacy skills through networking. As we study the "perfect fit" of telecommunications with language learning, educators in other areas may discover lessons to apply in their own classrooms.

References

Allport, G. (1954). /The nature of prejudice/. Cambridge, MA: Addison-Wesley.

Cummins, J. (1986). Cultures in contact: Using classroom microcomputers for cultural exchange and reinforcement. /TESL Canada Journal/Revue TESL du Canada/. 3(2), 13-31.

Daiute, C. (1985). Issues in using computers to socialize the writing process. /Educational Communication and Technology Journal/, 33: 1, 41-50.

Day, R. (1982). Children's attitudes toward language. In E. Ryan and H. Giles (Eds.), /Attitudes towards Language Variation: Social and applied contexts/. London: Edward Arnold.

Gervilliers, D., Berteloot, C. & Lemery, J. (1977). /Las correspondencias escolares/ (Editorial Laia, Trans.). Barcelona: Editorial Laia. (Original work published 1968 as /Les correspondances scolaires/ [Interscholastic correspondence]).

Levin, J., Riel, M., Boruta, M., & Rowe, R. (1984). Muktuk meets jaccuzi: Computer networks and elementary schools. In Freedman (ed.), /The acquisition of written language/ (pp. 160-171). New York: Ablex Publishing Company.

Mehan, H., Moll, L. & Riel, M. (1985). /Computers in classrooms: A quasi-experilement in guided change/. NIE Report 6-83-0027. La Jolla, CA: Interactive Technology Laboratory.

Riel, M. (1983). Education and ecstasy: Computer chronicles of students writing together. /The Quarterly Newsletter of the Laboratory of Comparative Human Cognition/, 5 (3), 59-67.

Riel, M. (1985). The computer chronicles newswire: A functional learning environment for acquiring literacy skills. /Journal of Educational Computing Research/, 1, 317-337.

Rosa, A. & Moll, L.C. (1985). Computadores, comunicacion y educacion: una colaboracion internacional en la intervencion e investigacion educativa (Computers, communication and education: An international collaboration in educational intervention and investigation). /Infancia y Aprendizaje/, 30, 1-17.

Sayers, D. (1986). From journals to journalism: ESL writers. /Puerto Rico TESOL-Gram/, 13 (3), 7-8.

Sayers, D. (1987). Bilingual sister classes in computer writing networks. In D. Johnson & D. Roen (Eds.), /Richness in Writing: Empowering ESL Writers/. New York: Longman's.

Sayers, D. (1988). /Interscholastic correspondence exchanges in Celestin Freinet's Modern School Movement: Implications for computer-mediated student writing networks/. Qualifying Paper, Harvard University Graduate School of Education. Cambridge, MA: Gutman Library.

Sayers, D. (1989). /Editorial Boards between Sister Classes/. Unpublished typescript for Qualitative Research Methods, Harvard Graduate School of Education.

Sayers, D. & Brown, K. (1987). Bilingual education and telecommunications: A perfect fit. /The Computing Teacher/, 17 (7), 23-24.

Slavin, R. (1979). Effects of biracial learning teams on cross-racial friendships. /Journal of Educational Psychology/, 71, 381-387.

Weigel, R., Wiser, P. & Cook. S. (1975). The impact of cooperative learning experiences on cross-ethnic relations and attitudes. /Journal of Social Issues, 31/, 1, 219-244.

TEN HOT TIPS FOR TEACHING TELECOMMUNICATIONS IN THE SCHOOLS

Len Scrogan, Princeton Regional Schools, U.S.A.

The field of educational telecommunications is constantly changing, improving, and becoming more practical. This workshop focuses on ten useful trends or concepts for the educational practitioner.

1. *The Newest and the Best in Communications Software.* For the Apple computer, not one package even comes close to the features and ease of use of ProTERM by Checkmate Technologies. For the IBM, look at SmartCom III and Procomm. For the MAC, Microphone is one of the best.

2. *An "Award for Telecommunications Excellence" goes to...* This is an award for some of the most outstanding achievements to date in the field of educational telecommunications. Awards go to the following groups:

> Dow Jones. For their new "relevance feedback" technology. This technology provides natural language interface and ease of use that really works for online database searching. There is nothing like it anywhere.
>
> The Moscow-San Francisco Teleport. For making soviet-american connections a cost effective reality.
>
> AT&T. For their new, cost-effective, and curriculum centered Long Distance Learning Network. This network works because of the quality of the curricula.

3. *How to Dial from Just About Anywhere.* Using appropriate tools or techniques, you can dial from just about any location or school. By using either acoustic coupler extensions, pseudo-dialing, extension cables, hotwires, line splitters or other techniques, your phone system can be hurdled at last.

4. *Using Telecommunications Simulations.* One of the biggest problems in telecommunications instruction involves providing enough student access to online experiences. The classroom logjam with one modem can effectively be remedied with a variety of Apple and IBM telecommunications simulators, including THE ELECTRONIC MAILBAG, THE ELECTRONIC VILLAGE, and WINDOWS ON TELECOMMUNICATIONS. These programs allow students to be trained offline. Skills learned are easily

transferred to actual online situations.

5. *A New Telecommunications Textbook.* SouthWestern Publishing Company is releasing the first ever high school level textbook on telecommunications: Telecommunications: Concepts and Issues. Slides will be shown.

6. *Modemless Machine to Machine File Transfers.* Sending information from an IBM to an Apple to a MAC is no longer a mystery. You can send files from machine to machine without a modem using a null modem cable, appropriate protocol settings and communications software. New null cable developments will be demonstrated.

7. *Integrating Telecommunications within Content Instruction.* A variety of integration ideas will be covered that span from language arts to foreign language.

8. *Using an Online Database: Some Interesting Research.* Some interesting research findings regarding student access to the online database will be reviewed. Session participants will have an opportunity to experiment with a new database/logic-structuring simulator based on this research.

9. *Teaching Telecommunications Ethics.* It is becoming ever important to teach telecommunications ethics in the schools. Guidelines for online behavior will be identified and discussed as a component of the curriculum.

10. *Cutting Phone Costs: Strategies that Work.* Using newer centrex technologies, your district phone bills can be reduced by a factor of 50% or greater. This technology is available in many communities, requires a minor installation cost, but maintains many advantages such as low cost, and the ability to disconnect for vacation periods with low reinstallation costs. Other cost saving efforts will also be discussed.

HYPER-POSTCARDS (TM): LINKING STUDENTS GLOBALLY THROUGH MULTIMEDIA COMMUNICATIONS

Gerry Sinclair, Simon Fraser University, CANADA

In order to explain the development of the concept of Hyper-PostCards, let me tell you a little about my work in the area of emerging information technologies. I am an education professor and director of a center in the Faculty of Education at Simon Fraser University called EXCITE (the EXemplary Center for Interactive Technologies in Education). Specializing in the field of teacher education and learning technologies, I work extensively with teachers and students exploring the creative learning potential that hypermedia, massive optical disc storage, and international telecommunications provide in transforming the present-day classroom. Before HyperCard appeared on the scene, the main focus of my work was in the field of global networking.

Between 1984 and 1987 I worked to develop a series of international tele-learning links between teachers and students in North America, Europe, Japan, and the Soviet Union. With these links in place, I was exploring the potential of computer-based communications in the global classroom, using telecommunications as a means to overcome the barriers to cross-cultural understanding. During this period I worked with a number of teachers and students to develop a wide variety of international networking projects, including several "electronic global fieldtrips" and " a weekend in the life" exchanges between students in Moscow, Kyoto, and Vancouver.

Despite the apparent success of these projects in breaking through the cultural and racial stereotypes of the participating students, I found myself becoming disenchanted with the limitations of Ascii text as the sole vehicle for electronic cross-cultural communications. As a result, I experimented with both audio conferencing and slow scan television in order to add the dimensions of image and sound to the communications process. However, since both audio and SSTV conferencing are synchronous, this meant that they could only be used at specific times (for example: 8 am in London and 5 pm in Tokyo; 9:30 am in Moscow and 10:30 pm the previous day in Vancouver) when we could manage to find students on both sides of the globe who were, if not in school, then at least awake. Moreover, communicating in Ascii text favoured those students who were textually-oriented and not those who preferred to communicate graphically, or with sound, or with a multiplicity of media. For these reasons, I was looking for some way to break through the Ascii barrier and increase the bandwidth for international school-to-school communications.

I came up with the idea of Hyper-PostCards in February 1988 when I was invited to be a facilitator at a "HyperCard Camp" that Apple Canada offered for teachers and school district computer coordinators in the province of British Columbia. After one of my multimedia workshops, I was approached by a dynamic elementary school principal from Vancouver Island (a former graphics artist and film-maker) who had become excited by the educational applications of HyperCard. He saw the power of letting kids digitize their faces and attach these images as a signature to their written assignments. He showed me the database stack he was making containing all the digitized images of the kids in the school, along with samples of their written work. As I looked through the stack I suddenly saw the potential of HyperCard for student-to-student communications. Because computer-based communications still has to deal with slow telephone lines (ISDN and high-speed fibre optic networks are not readily available in North America yet, let alone in Europe, the Pacific Rim, or developing countries), I first conceived as Hyper-PostCards as confined to floppy disks sent through the international mails. In a sense, the floppy itself becomes the PostCard to which students can affix a stamp and send it to their electronically twinned classmates in another community, country, or culture. Using Hyper-PostCards as presentation tool, students can be linked globally on a number of multimedia projects that cut across all aspects of the curriculum.

The first Hyper-PostCards prototype was based on a stack containing digitized photographs of all the students in a Grade 7 class at in Victoria, Canada. Each photo (image) also contains a button linked to a recording of each student's voice (sound) as well as a paragraph of introduction about themselves and another paragraph describing how they see themselves 20 years from now (text). The children's images are also linked to their favorite paintings on the National Gallery of Art videodisc (video), and to their research reports on the artists whose work they have selected (art history curriculum).

When I was in Japan last spring, I left a copy of the HPC prototye with Apple Japan and asked them to find an elementary school with which to pilot a cross-cultural Hyper-PostCard exchange. The idea was to find a school that had a Macintosh computer, HyperCard, a sound and an image digiter, and a videodisc player in a basic workstation configuration. When NHK TV decided to use the concept of Hyper-PostCards as the basis for a television program on a communications exchange between a school in Japan and a school in the UK, we had an opportunity to fieldtest the Hyper-PostCards concept. Shinmei school in Toyama was chosen as the site in Japan, and Highfield school in Letchworth was chosen as the participating school in the U.K.

I was fortunate to travel to the UK in order to work with the students at Highfield school. Both the Toyama and Letchworth students were the same age (11 and 12 years old) and they set about using Hyper-PostCards to introduce themselves and their communities to each other. As a focal point for their work, both groups of students exchanged a list of questions about daily life in the other culture. In order to overcome the language obstacles (the Japanese students did not speak English and the U.K. students spoke no Japanese), Highfield school decided to make use of Hyper-PosCard graphics in order to answer Shinmei school's questions visually rather than textually. In answer to Shinmei's question, "Do you have a president in your country?", a Highfield student drew a rather impressive portrait of Margaret Thatcher. Responding to "Who is the most famous person in the UK?", another Highfield student drew a picture of Michael Jackson. Each student's contribution included a voice-recording, a digitized photograph and drawing, a textual introduction, a question for the Toyama students and an entry in the Japanese-English Dictionary, created especially for the occasion.

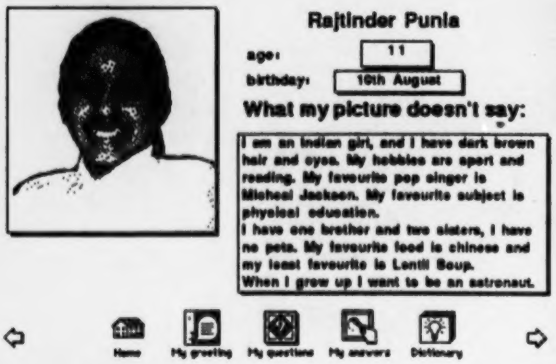
As part of the cross-cultural exchange, the Toyama students had sent over a list of twenty common food items in Japan, including bread, rice, oranges, fish etc., along with the per unit price in Japanese yen. They asked the Letchworth students to send them back the price of these items in pounds sterling. The Letchworth students complied but they also used this information to create a "Hyper-Dictionary". Each entry in the Hyper-Dictionary contains a drawing of a specific food item and its respective price in pounds and yen. It also contains the name of that item both in English and in Japanese. In putting together this part of the project, the Highfield students used the members of the NKH television crew and the Apple Japan technical team as an informational resource, drawing upon them to provide both the Kanji characters and the correct pronunciation for each word in Japanese. Each Highfield student recorded his or her own voice pronunication of the word in English and in Japanese. In this way, the Hyper-Dictionary became a wonderful cross-cultural teaching AND learning tool. The Highfield students both taught an English vocabulary item to their Japanese friends and in the process learned the word for the same item in Japanese (to the great amusement of their friends in Toyama). Both groups of students also had the opportunity to practise their mathematical skills as they converted yen and pounds in order to get a comparative price list for the staples of their respective societies.

The students at Shinmei school in Toyama created a number of equally charming Hyper-PostCards for the Highfield students. They created an elaborate map of Toyama which included representations of all the important town sites -- shops, school, kindergarten, and the local Pachinko (gambling) parlour. Spots on the map were linked to digitized photographs of the site itself, to the town's local characters, and to images of each student standing in front of his or her house. As a result of browsing through this stack, the Letchworth students received a remarkably intimate glimpse of Toyama through the eyes of children their own age who live there. In addition, the Shinmei students sent a special Hyper-PostCard gift created particularly for their new friends in the UK -- a musical composition which they wrote, performed, and recorded themselves, along with accompanying cartoon drawings of a musical theatre performance.

The first international Hyper-PostCard exchange was documented by NHK TV on March 21, 1989. Linked by 9600 baud modems and Farallon's Timbuktu remote software,the two schools participated in a number of real-time and asynchronous multimedia exchanges. The project was by all accounts a resounding success. As a result of participating in this linkup, the students in both Japan and the U.K. learned a great deal about life in each other's country and, at the same time, learned more than they expected about the history and culture of their own community as well.

As a result of the success of this multimedia exchange, other Hyper-PostCard projects are currently being developed in educational settings to explore further this method of computer-mediated cross-cultural communication.

Hyper-PostCards U.K.


Home
My greeting
My questions
My answers
Dictionary

Rajtinder Punia

age: 11

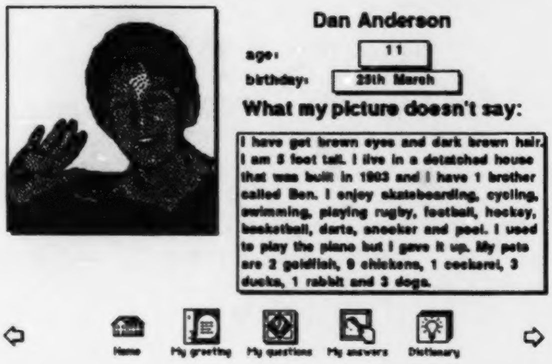
birthday: 10th August

What my picture doesn't say:

I am an Indian girl, and I have dark brown hair and eyes. My hobbies are sport and reading. My favourite pop singer is Micheal Jackson. My favourite subject is physical education.

I have one brother and two sisters, I have no pets. My favourite food is chinese and my least favourite is Lentil Soup.

When I grow up I want to be an astronaut.


Home
My greeting
My questions
My answers
Dictionary

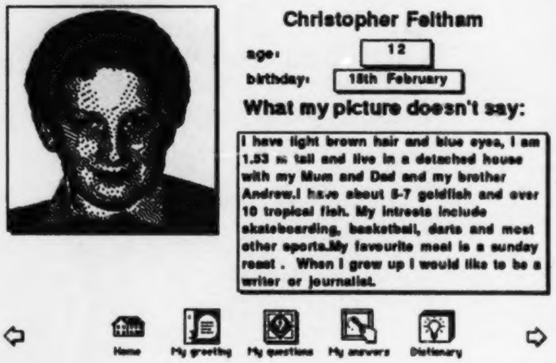
Dan Anderson

age: 11

birthday: 25th March

What my picture doesn't say:

I have got brown eyes and dark brown hair. I am 5 foot tall. I live in a detatched house that was built in 1903 and I have 1 brother called Ben. I enjoy skateboarding, cycling, swimming, playing rugby, football, hockey, basketball, darts, snooker and pool. I used to play the piano but I gave it up. My pets are 2 goldfish, 9 chickens, 1 cockerel, 3 ducks, 1 rabbit and 3 dogs.


Home
My greeting
My questions
My answers
Dictionary

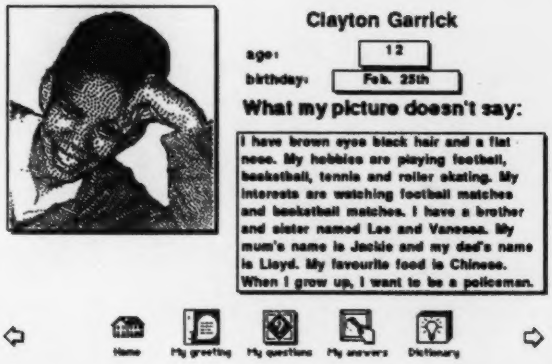
Christopher Feltham

age: 12

birthday: 18th February

What my picture doesn't say:

I have light brown hair and blue eyes, I am 1.53 m tall and live in a detached house with my Mum and Dad and my brother Andrew.I have about 5-7 goldfish and over 10 tropical fish. My intrests include skateboarding, basketball, darts and most other sports.My favourite meal is a sunday roast . When I grow up I would like to be a writer or journalist.


Home
My greeting
My questions
My answers
Dictionary

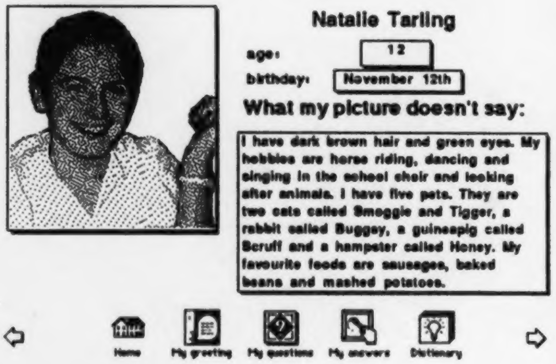
Clayton Garrick

age: 12

birthday: Feb. 25th

What my picture doesn't say:

I have brown eyes black hair and a flat nose. My hobbies are playing football, basketball, tennis and roller skating. My interests are watching football matches and basketball matches. I have a brother and sister named Lee and Vanessa. My mum's name is Jackie and my dad's name is Lloyd. My favourite food is Chinese. When I grow up, I want to be a policeman.


Home
My greeting
My questions
My answers
Dictionary

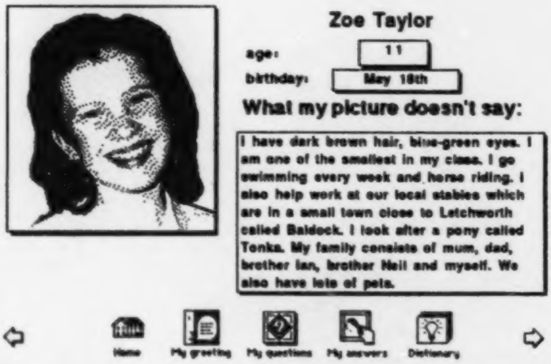
Natalie Tarling

age: 12

birthday: November 12th

What my picture doesn't say:

I have dark brown hair and green eyes. My hobbies are horse riding, dancing and singing in the school choir and looking after animals. I have five pets. They are two cats called Smoggie and Tigger, a rabbit called Buggey, a guineapig called Scruff and a hampster called Honey. My favourite foods are sausages, baked beans and mashed potatoes.


Home
My greeting
My questions
My answers
Dictionary

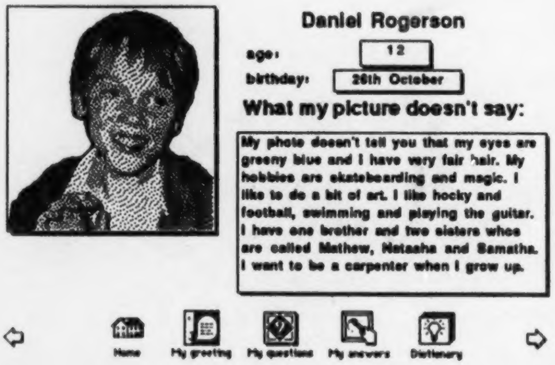
Zoe Taylor

age: 11

birthday: May 18th

What my picture doesn't say:

I have dark brown hair, blue-green eyes. I am one of the smallest in my class. I go swimming every week and horse riding. I also help work at our local stables which are in a small town close to Letchworth called Baldock. I look after a pony called Tonka. My family consists of mum, dad, brother Ian, brother Neil and myself. We also have lots of pets.


Home
My greeting
My questions
My answers
Dictionary

Daniel Rogerson

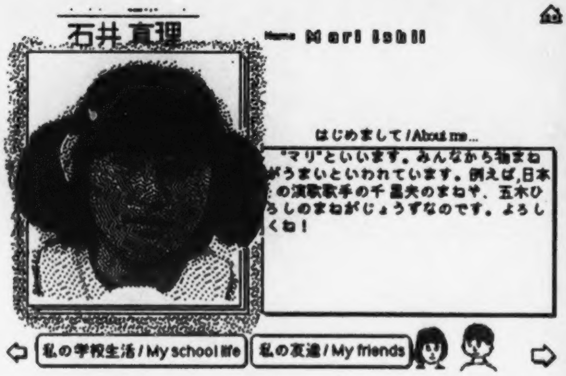
age: 12

birthday: 26th October

What my picture doesn't say:

My photo doesn't tell you that my eyes are greeny blue and I have very fair hair. My hobbies are skateboarding and magic. I like to do a bit of art. I like hocky and football, swimming and playing the guitar. I have one brother and two sisters whos are called Mathew, Natasha and Samatha. I want to be a carpenter when I grow up.

Hyper-PostCards Japan



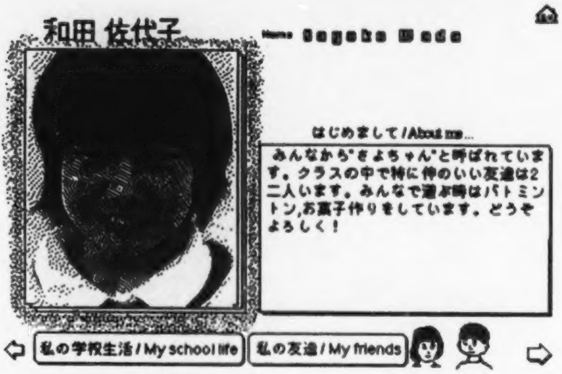
石井 真理

Name Mari Ishii

はじめまして / About me...

“マリ”といいます。みんなから物まねがうまいといわれています。例えば,日本の演歌歌手の千昌夫のまねや、五木ひろしのまねがじょうずなのです。よろしくね！

私の学校生活 / My school life
私の友達 / My friends



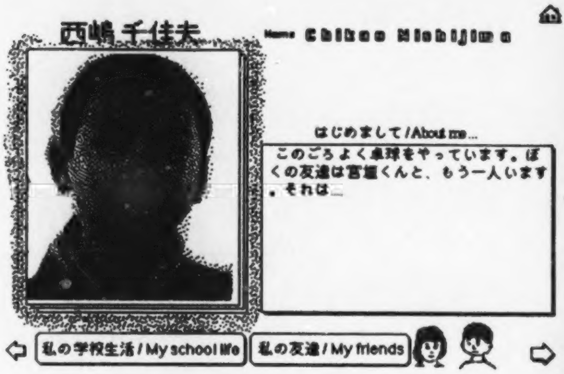
和田 佐代子

Name Sayoko Wada

はじめまして / About me...

みんなから“さよちゃん”と呼ばれています。クラスの中で特に仲のいい友達は2二人います。みんなで遊ぶ時はバトミントン,お菓子作りをしています。どうぞよろしく！

私の学校生活 / My school life
私の友達 / My friends



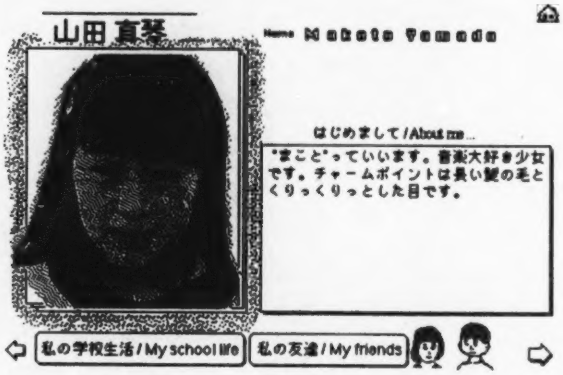
西嶋 千佳夫

Name Chikao Nishijima

はじめまして / About me...

このごろよく卓球をやっています。ぼくの友達は宮垣くんと、もう一人います。それは…

私の学校生活 / My school life
私の友達 / My friends



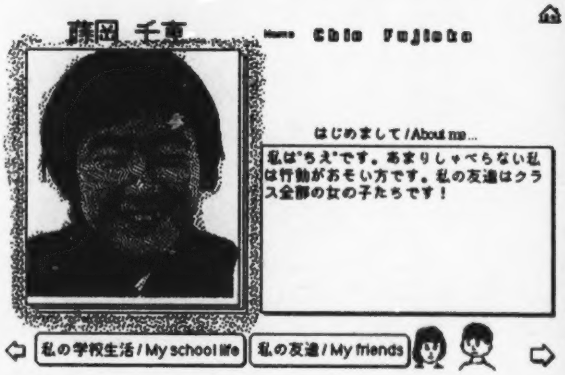
山田 真琴

Name Makoto Yamada

はじめまして / About me...

“まこと”っていいます。音楽大好き少女です。チャームポイントは長い髪の毛とくりっくりっとした目です。

私の学校生活 / My school life
私の友達 / My friends



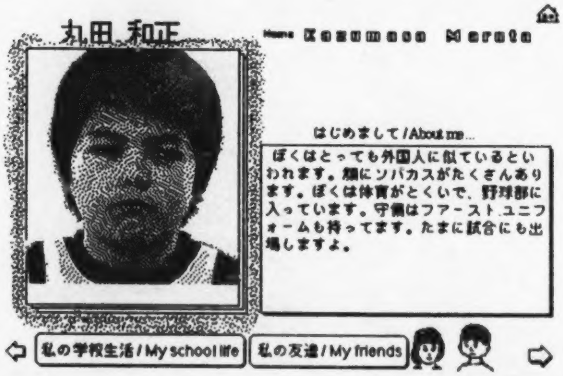
藤岡 千恵

Name Chie Fujioka

はじめまして / About me...

私は“ちえ”です。あまりしゃべらない私は行動がおそい方です。私の友達はクラス全部の女の子たちです！

私の学校生活 / My school life
私の友達 / My friends



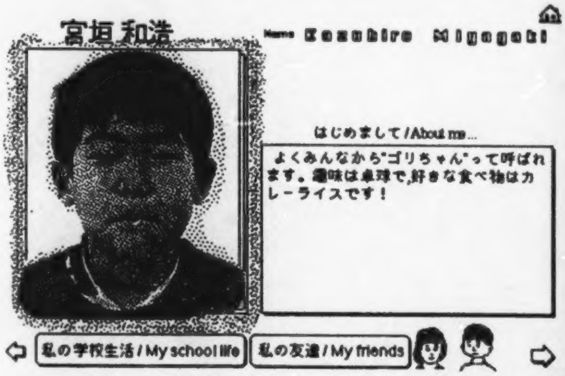
丸田 和正

Name Kazumasa Maruta

はじめまして / About me...

ぼくはとっても外国人に似ているといわれます。顔にソバカスがたくさんあります。ぼくは体育がとくいで、野球部に入っています。守備はフアースト.ユニフォームも持ってます。たまに試合にも出場しますよ。

私の学校生活 / My school life
私の友達 / My friends



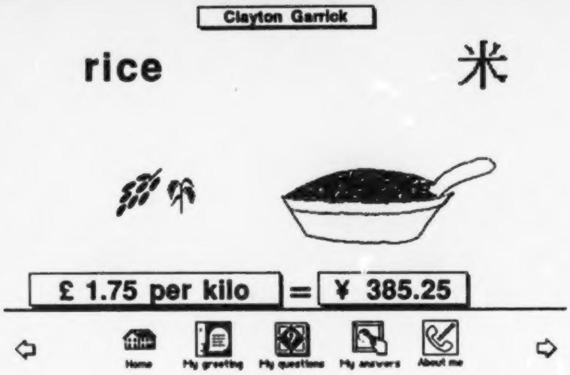
宮垣 和浩

Name Kazuhiro Miyagaki

はじめまして / About me...

よくみんなから“ゴリちゃん”って呼ばれます。趣味は卓球で,好きな食べ物はカレーライスです！

私の学校生活 / My school life
私の友達 / My friends

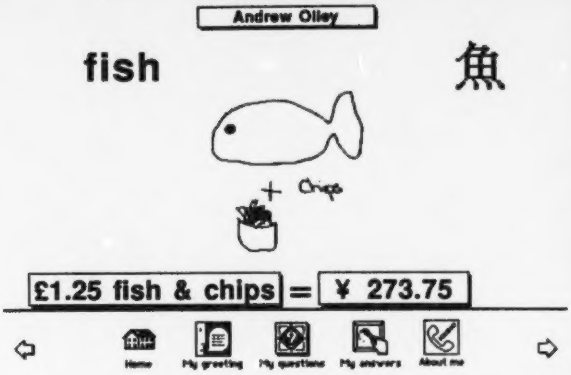


Clayton Garrick

rice 米

£ 1.75 per kilo = ¥ 385.25

Home
My greeting
My questions
My answers
About me



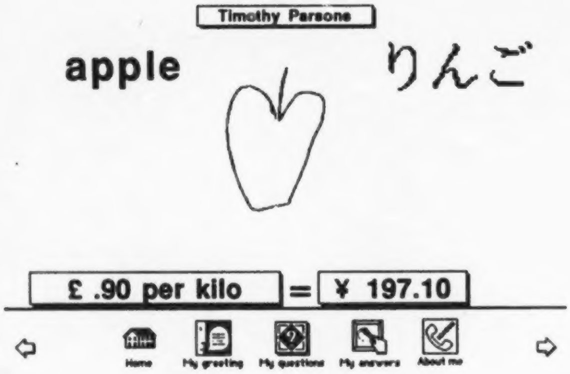
Andrew Olley

fish 魚

+ Crisps

£1.25 fish & chips = ¥ 273.75

Home
My greeting
My questions
My answers
About me

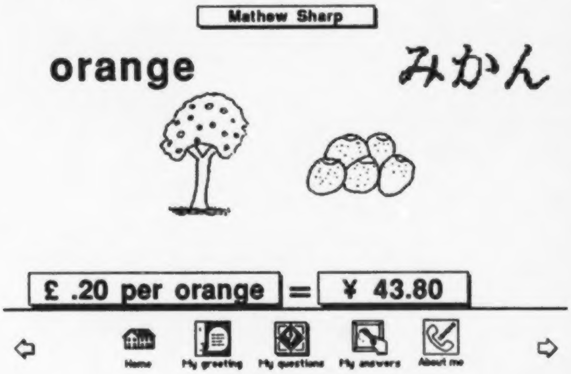


Timothy Parsons

apple りんご

£ .90 per kilo = ¥ 197.10

Home
My greeting
My questions
My answers
About me

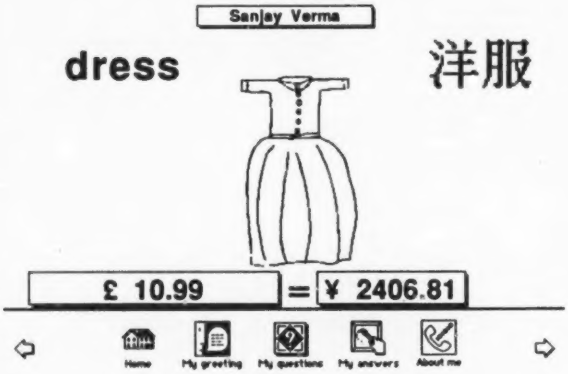


Mathew Sharp

orange みかん

£ .20 per orange = ¥ 43.80

Home
My greeting
My questions
My answers
About me

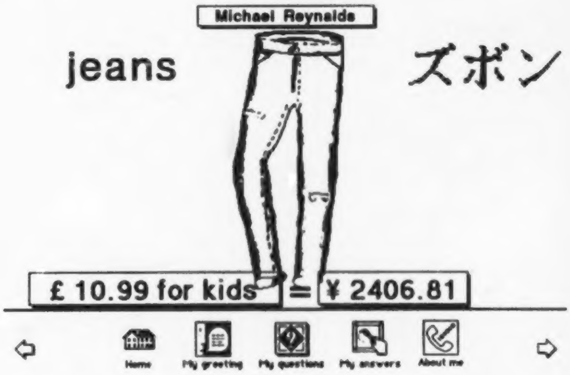


Sanjay Verma

dress 洋服

£ 10.99 = ¥ 2406.81

Home
My greeting
My questions
My answers
About me

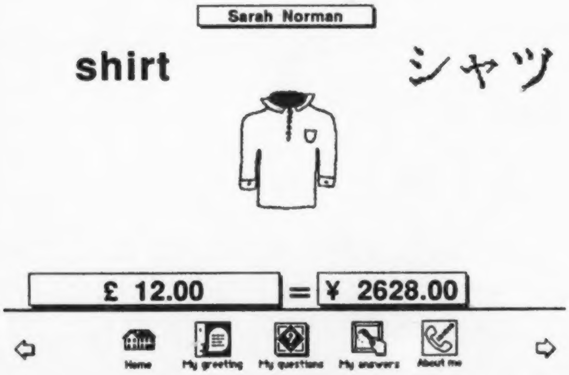


Michael Reynalds

jeans ズボン

£ 10.99 for kids = ¥ 2406.81

Home
My greeting
My questions
My answers
About me

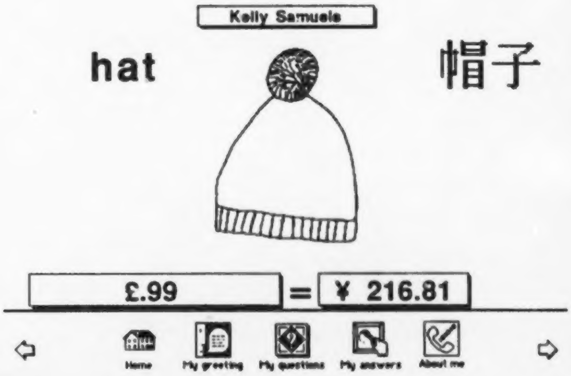


Sarah Norman

shirt シャツ

£ 12.00 = ¥ 2628.00

Home
My greeting
My questions
My answers
About me



Kelly Samuels

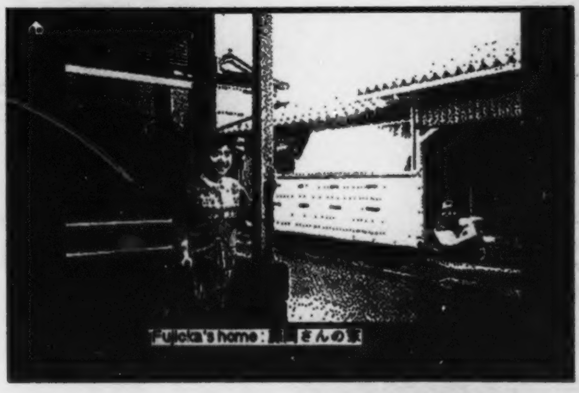
hat 帽子

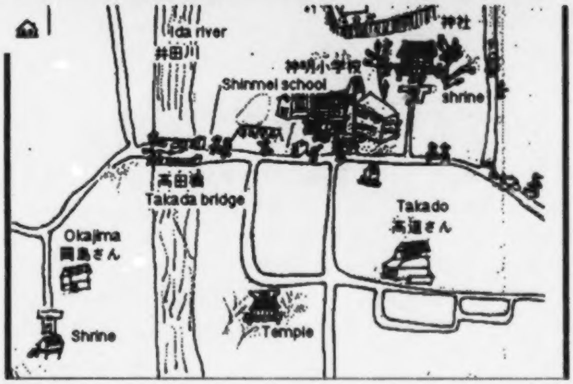
£.99 = ¥ 216.81

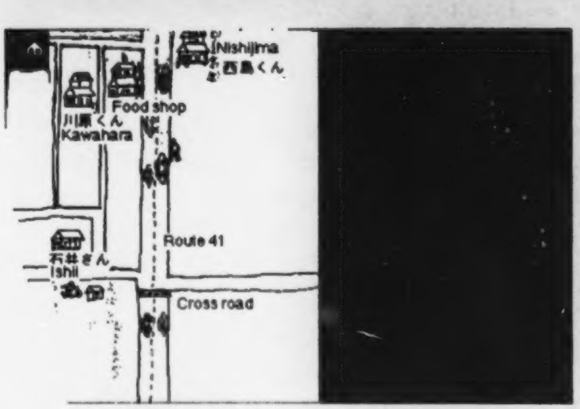
Home
My greeting
My questions
My answers
About me

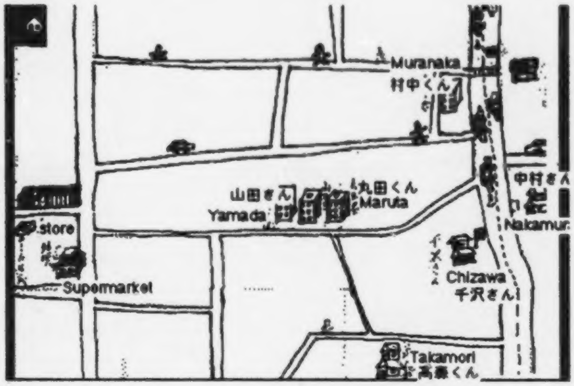
Welcome to Toyama

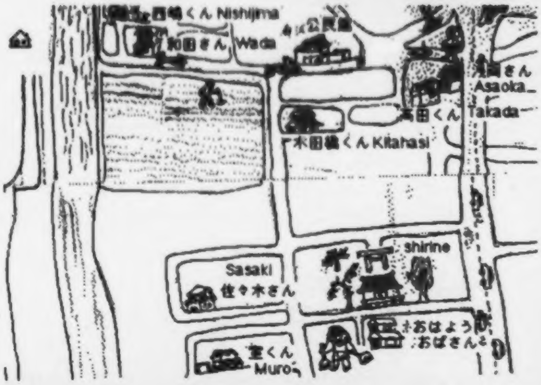
私たちの町：神明
click anywhere to begin

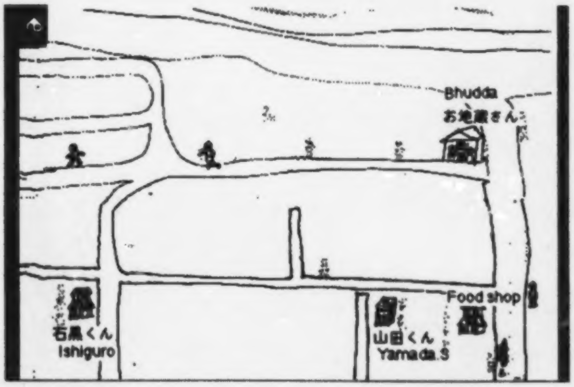

Fujioka's home : [illegible]さんの家


Ida river
井田川
神社
神明小学校
Shinmei school
shrine
高田橋
Takada bridge
Takado
高道さん
Okajima
岡島さん
Shrine
Temple


Nishijima
西島くん
Food shop
川原くん
Kawahara
Route 41
石井さん
Ishii
Cross road


Muranaka
村中くん
中村さん
山田さん
Yamada
丸田くん
Maruta
Nakamura
store
Supermarket
千沢さん
Chizawa
千沢さん
Takamori
高森くん


西嶋くん Nishijima
和田さん Wada
公民館
Asaoka
高田くん Takada
木田橋くん Kitahasi
shirine
Sasaki
佐々木さん
おはよう
おばさん
室くん
Muro


Bhudda
お地蔵さん
Food shop
石黒くん
Ishiguro
山田くん
Yamada.S

Granma "Goodmorning" a famous woman in our town
おはようおばさん

ELECTION '88 TELECOMMUNICATION PROJECT

Connie Stout, Texas Education Agency

Background

Every four years in the United States of America, students and teachers have the chance to observe a national presidential election. Usually this study is confined to social studies classrooms. As a natural outgrowth of the expansion of TEA-NET, the Texas Education Agency's electronic network, students from around the state as well as across the country, were able to take a closer look at the national election. This network gave students low cost access to other students who were interested in communicating.

Telecommunications was used to link students, to expand the walls of their classrooms and to make them feel they were active participants in their own learning. Participating teachers were able to extend their lessons beyond the basic curriculum found in their textbooks. They were able to integrate the project in a number of curriculum areas making Election '88 an interdisciplinary project. Seventh, eighth, and ninth grade students from three states, Texas, North Carolina, and Kentucky, learned how to use a computer and modem to communicate with each other across their district, state and country. These students learned to use technology to communicate with each other, not only about the national presidential election, but about other topics of interest as well.

Rationale

The purpose of the project was to give students and teachers the opportunity to learn about evolving telecommunications technologies and applications while studying an appropriate and timely event. Students read about the influence of communication media on elections at the national level, and the project gave them opportunities to actually use the media. Election '88 was a project designed to involve the students with current events, help them become better informed, and give them a change to share information with others outside their geographic region. This topic fit appropriately into the curriculum and was a particularly timely project because teachers were already planning to cover the material during the fall semester.

Outline of the Project

In order to participate in the project the classes had to have access to a computer, modem, telephone line, and THE ELECTRIC PAGES™ network. Participation was solicited from not only across Texas, but from other teachers in North Carolina and Kentucky. These teachers were given an outline of the specific tasks and time lines that were to be involved in the project. In addition, they were asked to budget $50.00 for the connect charge to THE ELECTRIC PAGES™ host computer. The project was designed to be open ended where the schools could become as involved as they wanted. Other activities were available. Some teachers shared curriculum information and some schools participated in video conferences.

Project Tasks

Each participating school was asked to complete three tasks for the project. The task were:

(1.) Write an introductory letter describing their state, city, and school.

(2.) Write one research article about the election. The article was chosen from a list of possible topics. Some of the topics included:
  a. Trivia facts about past presidential elections
  b. Requirement for the offices of president and vice-president
  c. Biographical information on the candidates
  d. Electoral college
  e. Poll tax
  f. Women's right to vote
  g. Election polls
  h. The party platforms

(3.) Cast their votes in a mock election held the day before the national election in November, and send the results to the student's "election central."

1. Introductory Letter:

Students began to send their introduction letter the first week of October. This gave the classes a chance to share information about themselves, stimulate interest in the project, and practice uploading files electronically. Electronic mail was voluntary between districts, and as soon as the introduction letters appeared, the students began to message each other and comment on their letters. Kathy Kothmann, the teacher from Texas A&M Junior High School, received several letters send to her students. She said that several of the letters were from students in other states that recognized Texas A & M University. This stimulated a series of messages about career choices.

Example of introduction letters:

A&M Junior High

By Nathan Zellner and Joe Cowart

Texas is the second largest state in the U.S. It is also one of the country's largest oil producers because it has some of the country's largest oil fields. It is a Gulf Coast State. Texas gets a lot of natural resources from the Gulf, including fish and oil. There are seaports to export goods to other places. Houston is one of these seaports. Two other major cities are Dallas and the capital, Austin.

The people that live in this state are very proud of where they live. They also take care not to litter the state or county in which they live. The state flower, the bluebonnet, is very beautiful. When people from other states come in the spring to see what our state looks like, they take care to stop and take pictures of the large patches of Bluebonnets.

The state is nicknamed the Lone Star State because back when we were trying to gain our Independence from Mexico, we had to do it ourselves, because the rest of the states did not want to go to war with Mexico. Brazos County is one of the most historical counties in Texas. Texas fought for its independence there. The Declaration of Independence was signed at Washington on the Brazos.

A branch from the Brazos River runs near and in the city of College Station. Texas A & M University is in this unique city. College Station got its name from the University and the railroad that dropped the students off from all over the state. But it has grown very much since then, and now people from all over the country go to A&M. College Station has a population of 50,000, and its unemployment rate is one of the lowest in Texas. College

Station is very close to Bryan, as the two cities overlap each other and it is hard to tell when you leave one town and enter the other. However, the neighboring cities are very different in many ways. College Station is a much younger town, celebrating only its 50th birthday as an incorporated town this year.

A very old school in College Station, A & M Junior High, is near the center of this town. The school holds two grades, 7th and 8th. The A &M Jr. High buildings are small and overcrowded, and a bond issue was passed last year to build a new junior high school. After the new school opens in 1990, this old school will be torn down. A long time ago, our current site was a High School, with only a few buildings. Now the school has bunches more, because portables have been added to handle all the students.

We have many extra activities where we have pep rallies to support all our athletic teams. One thing all the students love are the socials which occur four times a year. Our school has a high spirited athletic team, and we think we can beat anybody. Our school has a great amount of very nice teachers. It also has six halls, six portable classes. It also has a very large gym, cafeteria, and a library. We have two very helpful vice principals and a principal. Our school has a wide range of courses you can take.

Students in our school are very spirited. The mascot is the Kittens, as we get into high school, it will change to Tigers. The symbol is the imprint of a kitten paw. People from all over the country and from different walks of life live and go to school in this beautiful city, so we also have a very wide range of nationalities that attend our school. Since College Station is so near Bryan, the schools compete. Each one thinks they are better than the other.

Message the students from A&M Junior High at Box #4049

John A. Holmes High School

John A. Holmes High School is located in eastern North Carolina in the area known as the Coastal Plains. This section of the state could be classified as mostly rural. Tobacco, cotton, and peanuts are the chief money-making crops that industries here develop from and center around.

Chowan County is the smallest county in the state and is situated at the western end of the Albemarle Sound. The county's population is between twelve and fifteen thousand with nearly eight thousand concentrated in or near Edenton, the county seat.

Edenton's more notable favorite sons were Joseph Hewes, signer of the Declaration of Independence, Dr. Hugh Williamson, signer of the Constitution, and Dr. Richard Dixon, judge at Nuremburg. Tourism is a small, but thriving industry here.

John A. Holmes is located near the center of the town and is a part of the Edenton-Chowan School System. It is comprised of nearly seven hundred students, grades nine through twelve. Our school has been nationally recognized by President Ronald Reagan as an outstanding center of secondary education based on average SAT scores and disciplinary procedure averages that peaked in 1985.

Holmes is a relatively small school that has time for the individual; yet independence in decision making allows students to be able to attend large universities that otherwise might have been imposing by the impact of their size and impersonal appearance. John A. Holmes is a loud burst of education in a quiet, rural town where people still have pride in their community, their county, their state, and their country.

Message students from Holmes High School at TEP Box # 400210

2. Research Articles:

By the second week in October, the students began submitting their articles about the election. The articles included trivia facts on presidents, a synopsis of the Democratic and Republican Party platforms, information about poll tax, and the electoral college. Many of the teachers were able to program their computers to automatically download at night all new articles that were placed on the Election '88 bulletin board. In the morning, they would print the articles and post them on the class bulletin board for their students to read. Students from other classes were able to share the information.

Following is an example of one article submitted by students from Paducah, Kentucky.

The Electoral College:

The election is held every fourth year, on the first Tuesday after the first Monday in November. The voters do not cast their ballots for the President or Vice-President, but instead for "electors," who are members of the "Electoral College." These electors, provided for in the Constitution, cast their ballots to elect the President and Vice-President. The number of electors in each state is equal to the total number of the state's Senators and Representatives. Total electoral vote is presently 538, including 3 representatives from the District of Columbia. Regardless of whether some states print on the ballot the electors' names, the presidential candidates, or both, the voters are ACTUALLY casting their ballots for the electors. Electors are selected previously by party convention, party committee, or primary election, depending on the individual state. They are morally bound (in some states by law) to support the party's candidate. If the Republican party candidate receives a majority vote in a state, all of the electoral votes from that state go to the Republican nominee. The same is true if the Democratic candidate wins. While the results are actually known directly after tally of votes in the November election, the winning electors DO NOT cast their ballots until the first Monday after the second Wednesday in December at their State Capitals. Then it is the Presidential and Vice-Presidential candidates (from the same party) receiving the majority of electoral votes who are officially elected. Under this system, it is possible for a candidate to receive the most popular votes in November yet lose the election by not receiving the MAJORITY of the electoral college vote.

Contributed by students from Paducah, Kentucky

3. Mock Election:

Each school held a mock election on the Monday before the national election. Students sent their results via electronic mail to "election central." Here the votes were tallied and then posted on Election '88's electronic bulletin board. The results from the students' election were very close to the national results. At North East Independent School District in San Antonio, Texas, Bruce Koenig, a Computer Science teacher, designed a spreadsheet program that tabulated their results as students voted on their school computer. North East ISD voted on other issues such as the problem with San Antonio's surface water plan, a domed stadium for San Antonio, and a dress code for the middle school students. At Hill Country Middle School in Eanes Independent School District, students were required to register to vote prior to the election and have their voter registration card when they voted. The students voted during lunch, not during a class period. Because voting was voluntary and not required, only about 52% of the student body voted. Some of the students wanted to vote, but had failed to register or forgot their voter registration card.

Optional Activities

1. Video Conferences:

One additional activity that gave the project more variety were a series of live video teleconferences in which many schools participated. The students that participated in the project prepared a series of questions they wanted to ask representatives of the Democratic and Republican parties. The video conferences were held via TI-IN, a national satellite video conferencing network based in San Antonio, Texas. TI-IN delivers its programming via satellite to receiving dishes in schools in Texas, North Carolina and 25 other states. These conferences took place the last week of October and the first week of November just prior to the national election. Students from Eisenhower Middle School in San Antonio hosted the conferences. They interviewed representatives of the Democratic and

Republican parties. Other students viewing the conferences used the two-way audio conference capabilities of the TI-IN system to call in their questions during the live broadcast. The blending of the two technologies--computer conferencing and video conferencing--added a new dimension to the project. Technology made it possible for geographically separated schools to have live interaction with each other. Video tapes were made of the broadcast and sent to schools that were unable to participate in the conferences.

Following is a sample of the questions prepared by the students:

1. What actions will your candidate take to improve the financial conditions of farmers?
2. Many people, old and young, are using drugs today. They are influenced into starting drugs by unhappiness in life, peer pressure, and other reasons. Significant steps should be taken to eliminate drugs from our society. We know that the government is attacking the problem, yet we as the future generation are concerned that stronger and more effective measures need to be taken. What do you think the government needs to do to ensure a drug-free environment?
3. A common concern of many students is the need for money to support their college education. Many dreams are shattered today because of the lack of available government loans. Students who are unable to attend college due to money problems are denied future opportunities. If Michael Dukakis/George Bush is elected to office what will your political party do to insure to students available government loans?
4. An important issue today is pollution due to medical discard being washed up on the coasts of the United States. The main reason why the waste is being dumped into the oceans is because of the high cost of disposal. Would you be in favor of incentives or penalties to safeguard our beaches from further disaster? Why?

2. Curriculum Sharing:

Teachers involved in the project were able to share their own ideas and curriculum suggestions through the Election '88's electronic bulletin board. During the summer Betty Pyle and Sandy Bounds Cangelosi from Eanes Independent School District prepared a curriculum guide for the teachers in their district located in Austin, Texas. Although the teachers were using the guide for Computer Literacy, Betty and Sandy incorporated ideas that would reinforce objectives found in a study of a national presidential election. This was an interdisciplinary approach to learning using word processing, data base, and spreadsheet applications. An example of activities follows:

WORD PROCESSING ACTIVITIES

General Goals for Election '88:
Demonstrate patriotism. Learn public communication writing skills. Explore campaigning. Explore the role of technology in leadership selection.

Terminal Objective for this Word Processing:
Students will demonstrate mastery of the application of word processing by typing and printing a perfect page of text. They will have opportunities to find and correct mistakes using editing function such as SEARCH, REPLACE, MOVE, DELETE, INSERT, etc.

STRATEGIES AND ACTIVITIES:

Reinstate Prerequisites
Students will already know how to load software. They will have spent time going through the Appleworks "tutorial" on word processing.

VOCABULARY:

- word processing
- application software
- search
- replace
- insert
- delete
- edit
- text
- scroll
- hard copy
- document
- data
- data base

PRACTICE/ASSIGNMENTS:

DAY #1:ELECTION GLOSSARY.
Enabling Objective: Given a data disk with a list of 20 words already created and stored as a word processing document, students will use simple editing procedures (REPLACE, INSERT, DELETE) to change the given words to the "political" vocabulary listed on the worksheet.

FEEDBACK:Teacher will move around computer lab as students are working and observe progress of each student in making the corrections. Teacher will give verbal feedback and re-teach and help individual students as necessary.

DAY #2: SPEECH WRITING.
Given a data disk with a "Political Speech" already created and stored as a word processing document, students will make changes in the speech using editing procedures so that the speech might reflect a talk to entirely different populations of voters in various parts of the United States. (See worksheet "Word Processing Campaign Speech")

FEEDBACK: Teacher will move around computer lab as students are working and observe progress of each student in making the corrections. Teacher will give verbal feedback and re-teach and help individual students as necessary.

DAY #3: CAMPAIGN FUND-RAISING LETTER.
Given a data disk with a "form letter" created and stored by the teacher as well as a data base of information regarding registered voters, students will use editing functions of word processing to "personalize" the letter. Each student will print at least one personalized form letter. Some application software can "merge" the form letter with the data base, i.e., Microsoft WORD. If your software does not have the MERGE capability, students can personalize the letter by editing each one before printing.

FEEDBACK: Teacher will check printed copies of the "personalized" form letter assess the mastery. Individuals will be retaught and assisted as necessary to develop mastery.

Cecilia Denning from the North Carolina Department of Education sent other activities that teachers could include in their own lesson plans. This only emphasized the capabilities of how educators can utilize a network for collaboration, resource sharing, and support during a telecommunications project.

Challenges and Opportunities

Some schools experienced problems with hardware and software compatibility. For example, Hill Country Middle School in the Eanes ISD had difficulty because the students used Apple IIgs computers for word processing, but their modem was connected to a Macintosh computer. This created a problem because their teacher had to have a student rekey their articles for the Macintosh. They also had trouble when the modem failed and they had to borrow a modem. The schools in North Carolina had not used their state electronic mail network prior to the project, so their teachers had to learn a new system. The TI-IN video conferences experienced some technical difficulties with the two-way talk back system during both programs. Regardless of the difficulties with the technology, the participating teachers felt the project was successful and were eager to participate in other telecommunications project.

One unique opportunity was provided when Senator Lloyd Bentsen, the Democratic vice-presidential candidate, learned about the project. He took the time to tour one of the computer labs in a middle schools at North East ISD, and visited with Linda Paschal, Coordinator of Education Technology at North East ISD about the project. Senator Bentsen talked with students about the bulletin board and the Democratic platform. Impressions of the visit were recorded and then shared electronically with others involved in the project.

Conclusions:

The teachers felt the project was very successful. They were please with the quality of learning that took place in their classrooms Not only did their students learn about the national elections, but the teachers saw learning extend into many different instructional areas. Students became aware that students in other geographic areas shared like concerns. Computer Literacy teachers, Kathy Kothmann from A&M Junior High School and Ernestine Starnes from North East ISD, both said that the project got the students interested and more excited about the use of telecommunications. In addition, they felt the students were motivated to improve their word processing and writing skills. Lisa Williams, a Computer Literacy teacher from Kerrville, Texas, said that the project made her students more aware of national issues. All teachers felt that a project such as this was successful because it fit into what they were already doing in their classrooms, provided a source for ideas and suggestions, supplied a diverse population with which to correspond, and took very little time from their schedules.

One of the most positive statements was in support of the communication software that allowed teachers to store mail composed by all their students, automatically connect at night with THE ELECTRIC PAGES™ host, upload all their mail, and pull down all the new information that was posted on the Election '88 bulletin board as well as download all the mail for their students. Students in North East ISD were able to used their school's local network system that automatically sent their correspondence to the state host. This allowed their students to participate in the project without the expense of a connect charge.

Many factors are making the use of telecommunication a viable option to include in a school's curriculum. Educators are finding new communication software becoming increasingly easier to operate. They are also seeing modems decreasing in price. Now with schools having access to their own host via a local phone call, it is becoming more and more feasible to find teachers willing to participate in e curriculum based projects such as Election '88 where the main focus is on communication and collaboration.

BUILDING BRIDGES: KENTUCKY TO KYOTO

Hillel Weintraub, Harvard University School, U.S.A.

I. GENERAL INFORMATION

A. THE ENVIRONMENT AT LARGE -- Japanese education.

Much attention has been given recently to Japanese culture and Japanese education. Clearly in the short space of a report one must be careful not to oversimplify. Also, although journal articles are usually written in the third person, I feel that's a custom which should be broken when the experience being reported is a personal report which benefits from being written about in the first person. Japanese high school education, for the most part, is geared towards preparing students for university entrance tests. Though the nature of these tests has been changing over the years, with slightly more emphasis on the ability to use information rather than just recall it, the fact is that the Japanese university entrance evaluation system encourages a particular type of didactic teaching and rote learning. Certainly Japanese educators are aware of this and often talk about "changing the university entrance exam system"; still, no significant steps have been taken by the National Ministry of Education (Mombusho) to expand the evaluation methods -- a one or two day intensive testing session is presently the only means of judging whether a student be allowed to enter university.

B. THE SCHOOL

The school where this project took place was Doshisha International High School (DIHS) in Kyoto, Japan. In the early '80's Doshisha had a willingness to deal with a situation in Japan that few others were paying attention to: helping an increasing number of Japanese youths who had lived abroad with their families who had been stationed overseas for business purposes. These young people, in Japanese called "kikokushijo" -- literally, children who have come back to their country -- were causing a lot of trouble in Japanese society because they didn't fit into any category which people were ready to deal with. Here were these children who looked Japanese, but acted so foreign, dropping back into a culture that has had little experience in dealing with variety or individual differences. The popular Japanese saying, "the nail that sticks up, gets hammered down," is an accurate description of what happens in subtle and not-too- subtle ways, when members of the society stick out. In the early days of DIHS, the emphasis was clearly on indoctrinating the students into Japanese life and getting them to think and act as much like other Japanese as possible. Gradually, however, more respect has been given to what they are -- young people with a wide range biculturalness -- rather than what they should be -- "pure" Japanese[1]. This change has resulted largely from a recent emphasis in the rhetoric of business leaders and politicians on the importance of "internationalism", the latest buzzword.

The view now seems to be that these "returnees" could develop into a valuable natural resource, which in Japan is a very important classification since people are the resource upon which this world's leading economy has been built. And, like all concepts, the idea of what is acceptable Japanese behavior is undergoing continuous change in boundaries.

C. CLASSROOM ENVIRONMENT

The Seminar English Program at DIHS was developed at least partially as a counter effect to the push of getting the returnees to become "like Japanese" again; the programs' emphasis was to encourage them to take some control in their lives for their thoughts and actions, rather than just be unconsciously overwhelmed by any one culture. Although done in the context of a language class, the emphasis was to develop their awareness of cognitive and social styles through language, rather than just focusing on language itself. In addition, the Seminar Program's teachers felt that too much of the students' education was focused on remembering rather than thinking,and they wanted to help the students develop a deeper awareness of their own thinking and learning processes and begin to develop an extensive range of thinking skills.

Teachers in the program continually worked on developing their awareness of how to help students without taking away their opportunity to discover things by themselves. Students often made up and corrected tests for themselves and their peers and were encouraged to broaden their view of tests. Though there was little support for this idea in the rest of the school or society, the teachers and students in the Seminar Program used tests as a means of getting information about where to focus teaching and learning energies.

(1) Unfortunately, the myth of racial purity still rears its ugly head in Japan,even in the highest political circles, as when former Prime Minister Nakasone spoke about the purity of Japanese race being a reason why Japan didn't have many of the social problems which existed in the West. Usually this idea is not spoken about publicly, but the belief that the Japanese are a "pure race" certainly is a deep-rooted feeling in Japanese society especially among older, more traditional Japanese people.

D. UTILIZATION OF TECHNOLOGY IN THE CLASSROOM

In the Seminar English Program, video and audio tapes, and special types of computer software -- word processing, Logo, simulations -- were used as tools to further the ideas expressed earlier: to develop respect for each other's ability and ideas, and to learn skills while addressing meaningful real-life issues. Students were given a chance to develop their own projects at the end of their junior and during their senior year. They were free to chose any project as long as they used English in some way which was meaningful to them. Some of them made their own videos, translated song lyrics or created music, studied typing, or utilized word processing to communicate with others and improve their writing. Since the installation of a permanent telephone line, a number of students have developed their own projects involving telecommunication with students in other countries.

II. SPECIFIC PROJECT INFORMATION

A. GETTING STARTED

At the beginning of 1986, Leslie Flanders at the Department of Education in Kentucky started working on the idea of a telecommunication project between Kentucky and Japan. Her proposal met with interest from the state because there had been a significant increase in contact between the two cultures during the past few years due to Japanese businesses coming into Kentucky. After getting initial support from the state, Leslie arranged for Apple Computer Corporation to supply the computers and modem and Tom Snyder Productions to supply the software package[2]. Leslie began her search for a school in Japan. Looking in The Computing Teacher, she was able to locate a list of international computer organizations, but the only one in Japan was S.M.I.L.E., the Society for Microcomputing in Life and Education. At the end of the summer of 1986 Leslie wrote a letter to me as the founder and president of S.M.I.L.E, asking if I knew of a school in Japan which would like to play "The Other Side" with a school in Kentucky. Leslie's ideas, and even the name of her project, "Bridge to Understanding", seemed to fit in with a number of ideas that I had been promoting in the Seminar Program. After a month of discussions with the administration, staff and students, Doshisha decided to support this activity. Four girls and two boys -- all seniors -- volun- teered to make up our team.

(2) The Other Side, Tom Snyder Company, Cambridge, Massachusetts.

C. GETTING READY

The computer hardware and software had arrived and I began to communicate with the "coach" of the Kentucky team, Frank Olson. Frank had spent some time in Japan and expressed great affection for the country and people. He and his students had already begun to study about Japan in anticipation of playing the game and corresponding with the Japanese team. Faced with the question of how much I needed to know in order to faciliate the practice, I decided to work through the manuals enough to make recommendations to the team about where to find their own answers for questions, and I played the game enough to get the basic idea and strategy without working through all the intricacies. It was my experience that one way to establish an exploratory learning environment was to make it clear that the students could get some help from me but couldn't depend upon me for everything. It was also valuable, I felt, for them to be able to teach someone else -- in this case, me -- as they began to learn; this allowed me to model certain learning behaviors such as questioning techniques and problem solving strategies. There was no pressure on the students to do anything. Their goal, defined by the project, was basically to have a successful experience in playing the game and developing some understanding of new technologies and internationalism.

Some interesting things happened during our practice sessions. One day I noticed that one of the boys, H., who was initially very worried that he would be the only boy in the group because he didn't feel comfortable working with girls, had become so involved with playing the game that he lost all awareness of the usual sexual boundaries which he normally operated by. Some other interesting things happened which I noted in my log: It's interesting how little worlds can begin to develop their own reality. so little attention is given to that in class design. The idea of microworlds is so powerful. The class can be given its own feeling, its own life. That is one thing which I have relearned through this game: playing it, observing others playing, too. Today H. brought some Hall and Oates music tapes and that seemed to help everyone relax. At first I resisted, but he said, "let's try it and see if it interferes in any way. It was soon obvious that it helped the atmosphere when played at a reasonable volume. (I had been playing music which I thought was relaxing!) I was glad that he felt comfortable enough to express his feeling so openly with me. After playing the game, we had a discussion and one of the things which came out was that the things we learn don't always have to be textbook things. It can even be that we learned something about another person. T. might have learned something about H. that she didn't know before.

It is this kind of contact which breaks down barriers between people. How often do we dislike someone because we don't know them? T. said that she noticed that cooperation between the two teams seemed to be easier this time. One student said it a little differently: that with experience cooperation became easier; when we became familiar with what we were doing it was easier to cooperate with each other. I thought this was a good insight. H. pointed out that in today's game, each side had enough money, so things worked out well. I added that economic factors are very important when we are trying to cooperate. It's easy to just talk about cooperation, but without money, it's very difficult. "Impossible!", someone said emphatically! Next I turned my attention to getting ready for the media and guests who said they would come and watch the game. Frank had sent a copy of a newspaper article which had appeared in a Kentucky paper announcing the game, and to my dismay I began to notice how playing this game was being distorted. Kentucky Challenges Japan in Long Distance Game, one headline shouted. The article stressed the competitive nature of the game rather than the cooperative play, omitting what to Leslie, Frank and all the players and I, was the important aspect of this simuilation : two countries needing to cooperate to become stronger rather than try to be superior. The article made it sound like an international football match. Another problem which I could foresee was that the media and guests' attention would be drawn toward the technological rather than the human or educational aspects of the project. Technology was flashy; numbers were easy to grab: how many computers, how much money, numbers were what the media liked to dwell on[3]. I recognized that what the media reported, in fact, what the media saw, could not be left to chance, because left alone, everything would be viewed through the modern-day cultural filter that emphasized numbers and competitiveness[4] I knew that on the day of the game, the players and I would be too involved to guide the visitors, reporters and camera people, so we designed a sixteen page booklet to explain the game, why we were playing it, and what we were learning from the experience. The booklet would be passed out to all visitors, and before the game started, the students and I would introduce the game and the educational philosophy behind it.

(3) For one discussion of this tendency see "Computer Criticism vs. Technocentric Thinking" by S.Papert, published in Theoretic Papers, Logo '85, MIT and reprinted in S.M.I.L.E.'s journal, Four Corners, Vol. 6, No. 3, Spring, 1988, Tokyo, Japan.

(4) For an expansion on this idea, see the article by me in the journal, Four Corners, called "Personal Philosophy and Classroom. Practices: Using Tech. as a Tool for Putting our Living and Learning Philosophies into Effect"

I had been reading Metamagical Themas and was fascinated by Hofstadter's discussion of the way ideas occupy and spread within viral space[5]. My concern for keeping the media from distorting the intention of this project became of prime concern. I wrote in my log: I want to be able to lead the media, rather than have the media lead us into performing or presenting things in a certain way. I am glad that we can get attention, but I want very much that it is a positive kind of attention, that can make people think about education and internationalism and in a new and slightly deeper way, not just present something in terms that they already are familiar with, just to titillate their interests.

F. THE MORNING/EVENING OF THE GAME

Over two hundred teachers had gathered in the Hyatt Suite of the Hyatt Regency Hotel in Lexington, Kentucky at 7:30 p.m., ready to watch a large screen projection of the Kentucky team's game and a map showing the movements of both teams/countries as they drilled for the necessary fuel to run their economies. On the wall was a large photograph of the Japanese team. Frank Olson, Leslie Flanders, Tom Snyder were on hand to moderate the game. The governor of Kentucky, who had just returned from a trip to Japan to recruit more companies to open factories in her state, had sent a welcoming letter which was read to the audience. Frank Olson was waiting to put a voice call in to me. In Japan, it was 9:30 a.m. The furniture in the Learning Center had been rearranged so that the team was seated in the center of the room, allowing the visitors and the tv cameras to be able to move around them. Two monitors had been set up on the back wall of the room so that observers could see the action of the game. Four members of the team would be playing, the other two were assigned the roles of guides. Two professors from Tokyo University had travelled three hours on the bullet train to watch; another half-dozen educators from nearby schools and colleges were there, along with reporters from three national newspapers and one local paper; The principal of the school, as tradition necessitated, came in and welcomed all of the visitors, telling them that this was an occasion which many people had worked hard to make successful and offering his support for such educational projects in the future. (I noted that well!). As the students got ready for the game and a few passed out the booklets they had created during the week, I spoke to the guests mentioning the importance of paying attention to the interaction of the students, the way they worked together, and thinking about this project as an example of the kind of education we would hopefully see a lot more of as our concept of learning environments changed.

(5) See Douglas Hofstadter, Metamagical Themas, New York: Basic Books, 1985.

Teachers and students would work together in different ways; students would be more involved in designing and implementing their own learning experiences; what was being studied in the classroom would have a clearer relationship to life outside the classroom.

One of the students, very nervous and totally bi-lingual, translated my talk into Japanese, his first public experience in translation. Another student answered guest and media questions about the event and what led up to it. Suddenly, the telephone rang! It was Frank, asking if everything was ready. It was. Each member of the Japanese team got on the phone and spoke a message of good luck which was broadcast over a loudspeaker to the Kentucky audience. Some political dignitaries from Kentucky got on the phone and sent their congratulations and wishes for good luck. Then Frank dialed our computer through his computer while everyone held their breath. It had worked a few days before. Would it work this time?

Readers who have worked with technology in public, or even just had a lot of experience watching others work with technology in public, know the truth of the Murphy's Law: "Everything that can go wrong, will." Readers of Douglas Hofstadter perhaps know his version: "Everything that can't go wrong, will." Well, on this particular day, everything that could or couldn't go wrong, didn't! It was truly amazing how smoothly everything went technically, which was right in line with what I was hoping for: not to have the technology overshadow the human element.

III. PROJECT EVALUATION

There are as many ways of evaluating something as there are evaluators, which is natural because people have various agendas. What is disturbing is that certain kinds of evaluation, usually presented as showing some sort of "statistical significance", are presented as rational for support or not supporting some educational event.

In the case of "Bridge to Understanding: Kentucky to Kyoto," different people were hoping to get different things out of it: education, experience, fun, money/publicity, challenge. The educational criteria themselves could be broken down many ways. Is English ability the key factor; or personal growth; or a fresher view of the world political situation? It was in English class that this project was developed. So how much English did the students learn? How can that be measured anyway? They spoke and read in English; they translated from

English into Japanese and Japanese into English when they created the booklet. But how can we measure their achievement? I could hold up the booklet as a measure of their achievement. But someone, somewhere would ask, "Yes, but now much more do they know about translating now than they knew before the project? Give me a test score; show me if they are closer to becoming a grade one licensed translator."

When evaluating a learning project it is important to differentiate between short term, middle term and long term effects. Most studies, because of obvious limitations, focus on short term effects which can be measured by a single instrument. For the media, and often for administrators who are concerned about funding, looking at the short term effects is sufficient. For teachers and students whose lives are certainly affected by the media and by school officials, obviously short term effects must be given consideration, but they should not be allowed to take over the main focus of the project.

Judged from the short term effects, the project was a success, mostly because of its uniqueness factor, rather than any educational value in a traditional sense. If someone checked for short-range educational results by creating a pre and post-game test to measure understanding of geography, politics, general English vocabulary, or the use of computer simulations, it would probably have shown no statistically significant changes. But there were a lot of short-term payoffs for the students and teachers involved that would be more difficult to measure on a standardized test form: media attention resulting in prestige in the school community, familiarity with technology, increase in self-confidence in working with new projects. In addition, for me it provided an opportunity to publicize a way of looking at education which I had been advocating more quietly over my teaching career.

Over the longer term, the value of this project is hard to measure. Although the telephone with the outside line was removed immediately after the game, eight months later, when the new budget request was approved, a permanent outside line was installed, allowing other groups to begin their own projects. This probably wouldn't have happened without the success of the Kentucky-Kyoto project.

There are also the aspects which can never be seen: personal, educational, and occupational decisions that might be effected in some way by experiences such as involvements in various learning microworlds. The likelihood is negligible of someone becoming a effective primeminister, economist or parent and saying, "I'm this way because I took part in the 'Bridge to Understanding' project in my high school days." And of course they aren't "that way" because of any single event, but a collection of events certainly can help shape the way people are.

As a long-range goal, I was particularly interested in affecting the way people around him looked at learning environments. From the creation of the booklet by the students, to the student-run event presented to the media, I was working toward showing a successful model of student centered education. Further, I hoped to demonstrate to show that technology could be used in this type of environment, rather than in the more top down, teacher-controlled classroom that Japanese were accustomed to. Was the program successful on this account? "Success" has many levels and many time-frames. Opening someone's eyes is a first step; softening the boundaries of how they look at something is an important step. Getting someone to realize, "I didn't notice..." or "I didn't know..." or "I never thought ..... before" or "I first saw...." can lead to a wide range of attitudinal and behavioral changes, but they are nearly impossible to measure meaningfully.

Some observations from people involved in playing or watching the game are enlightening. An official of NTT (Japanese Telephone and Telegraph), who helped set up the telephone lines and attended the teleconference, wrote: Congratulations on your success. I was impressed by the educational trial which you planned and completed. The contents of the computer game were very timely. We are inclined to be interested in the system itself, equipment, hardware. This time, I realized I was mistaken, the most important thing is what to do using hardware. Hardware, including a telecommunications system, is no more than a support tool. Of course I prized his letter! From the students in their notebooks:

- ...I learned how important trusting is. Also I found out that we have to do everything with patience, and it will turn into great happiness when we succeed.

- As I went on with the game, I thought it needs cooperation with others -- even with the other side's team. It was hard to cooperate and understand each other without facing each other. (Well, it's hard even if we face each other!) We must be honest and have to believe in the others to get to know each other in a short time.

- I have learned something through this game, something beyond the excitement of the software: this is about the idea of collaboration. To think about the other side and their people, and how hard working together is, is the basic and most important point of communication.

- I also think this game is important because it teaches us things while we're having fun. Usually learning things at school is boring, but this game is amusing. I think it would be fun if we made the leaders of the major countries play this game. It would be interesting to see what they would do to reach the goal of building a bridge. Simple, but the game contains important things. We learn that negotiation and trusting each other is very important for both sides when we play the ame. I know that real world politics is not as simple as this game; however, if nations trust each other more, we won't have to spend a lot of money for a single bomb or a single plane for military use.

And finally, my personal thoughts about this: Who is to say that it's important to finish what we start?

The Talmud -- some- where -- says that what is important is to start! Perhaps someone else will finish it; perhaps we will learn something important and start something else; perhaps the starter will continue it so many years down the line when the evaluator is no longer watching. What nonsense to think that anything worthwhile is ever finished anyway!

CHAPTER III

EVALUATION OF TELECOMMUNICATIONS PROJECTS

THE USE OF AUDIOGRAPHICS IN DELIVERING DISTANCE EDUCATION PROGRAMS

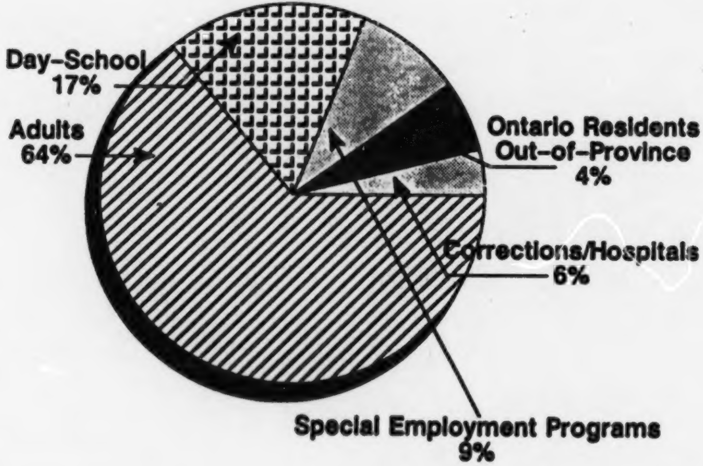
Terry Boucher, Ministry of Education, CANADA

INTRODUCTION

The vast reaches of Ontario, Canada's largest province, has provided a significant challenge to our educational system—how to ensure that there is equality of access to educational opportunity throughout the province. While more than ninety percent of its 9.5 million people inhabit a narrow band of southern Ontario, the remainder is spread throughout the northern parts of the province's 640 thousand square kilometers.

THE ROLE OF DISTANCE EDUCATION

In 1926, the Ontario Ministry of Education established a branch to deliver correspondence education programs to its isolated students. That branch, now known as the Independent Learning Centre (ILC), is responsible for the delivery of elementary and secondary programs to over 90 000 students annually. The following chart profiles the learner groups who make up ILC's student body.



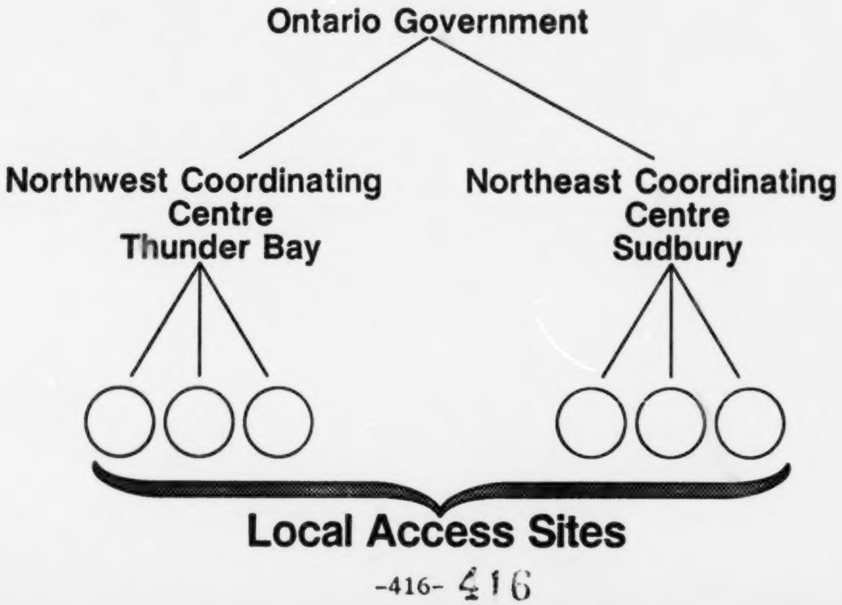
At the post secondary level, there are numerous opportunities to enroll in distance education programs which are offered by a wide variety of the province's colleges and universities.

CONTACT NORTH

The role of distance education in extending access to educational opportunity is widespread and generally accepted within the province. As part of its recognition of the importance of this role, the government of Ontario funded the establishment of Contact North, a distance education network designed to provide an "electronic highway" for the delivery of distance education programs at all levels throughout the province's northern regions. As a result of Contact North, the following opportunities and benefits have been provided:

- An infrastructure or network has been established which will facilitate (and even encourage) the delivery of programs, and permit long term planning in distance education at all levels.
- An array of media has been made available, permitting educators to develop programs using media which meet their needs. All levels of education have access to the same integrated network.
- The investment in the Contact North initiative is a clear recognition of the importance of distance education in the educational community.

Begun in 1986, Contact North is a four-year pilot project costing $20 million. At the end of the pilot, a decision will be made with regards to the future of the network, which is organized as follows:


Ontario Government
Northwest Coordinating Centre Thunder Bay
Northeast Coordinating Centre Sudbury
Local Access Sites

Currently, the network consists of thirty-three local access sites. Typically, these sites are located in small communities throughout the north. Each access site is equipped as follows:

- a site coordinator
- computer equipment
- computer-conferencing capability
- audio conferencing equipment
- fax machines
- audiographic equipment
- various other audio-visual equipment

ILC'S SMALL SCHOOL PILOT PROJECT

For many years, ILC has been involved in supporting the delivery of courses to small schools throughout the north. Because the bulk of their resources are required to address the core curriculum requirements of their students, many schools have had to turn to ILC's distance education programs to allow them to offer a broad range of course to meet diverse student needs. In the past, these programs have typically been print-based correspondence courses. For the past two years (1987-89), ILC has sponsored a pilot project where ten courses (five in English; five in French) were offered to students in thirteen schools throughout northern Ontario. These courses are based largely upon print-based independent study materials as they were in the past. However, in addition, students are brought together in an 'electronic classroom' once a week to meet with their teacher and classmates. These meetings give the teacher the opportunity to enhance program, address student difficulties, monitor progress and offer any other assistance which might be useful. Lesson assignments are delivered by fax, with students generally having graded lessons back before the next lesson. As well, teachers are able to use a wide array of other resources or media, such as computer conferencing, computer-assisted instruction and audio-visual equipment.

In the first year of the pilot, these meetings involved the use of audio links only. In the second year, teachers were given the opportunity to use audiographic communication in place of the audio.

Audiographic Communication

Audiographics is the integration of voice and graphics using telecommunication. It allows simultaneous, interactive communication between teachers and students, with each being able to hear what the other is saying, and see what each is doing.

An audiographic system consists of the following:

- a platform (computer)
- graphics tablet
- modem(s)
- audio-conferencing equipment
- large screen monitor (optional)
- slow scan camera (optional)
- graphics scanner (optional)
- printer (optional)
- fax (optional)

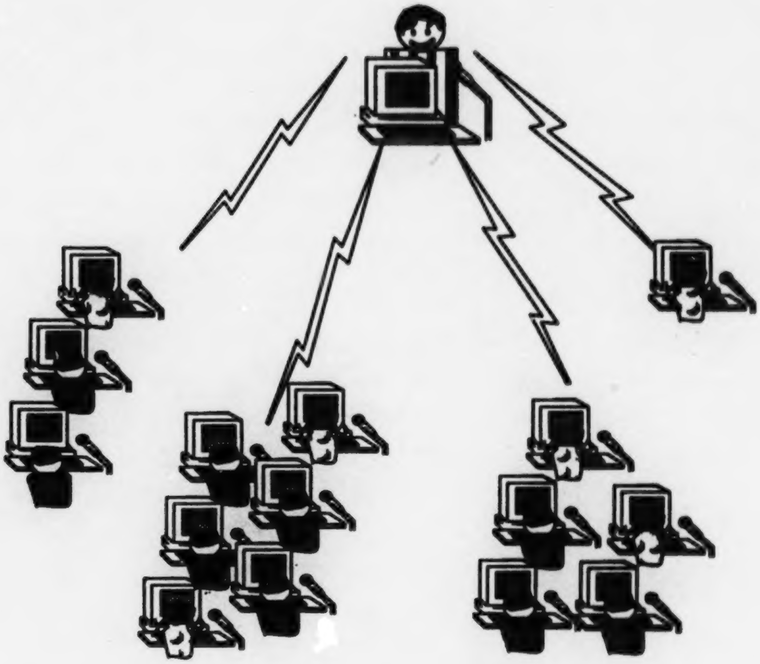
Modes of delivery using audiographics

An audiographic system can be used in a number of ways.

- Electronic blackboard. In the immediate mode, the system can be used to explain a concept in much the same way as a traditional blackboard would be used.
- Electronic "overhead projector". Slides can easily be created in handwritten format, generated by the computer, "grabbed" from other computer applications (such as an electronic spreadsheet), or freezing frames taken from a slow scan video camera.
- Images can be delivered to sites prior to the class, or they can be delivered in real-time during the class.

An electronic classroom scenario

An electronic classroom scenario involving audiographic communication might appear as follows:



PRELIMINARY RESULTS OF PILOT PROJECT

Schools which have made use of ILC print-based materials in a correspondence mode have typically had forty-one percent of students complete their courses. Year one of the pilot, which involved adding an audio-conferencing component to the program, resulted in a fifty-one percent completion rate. In year two, when teachers had the opportunity to use audiographic communication, approximately seventy-four percent of students completed their courses.

THE FUTURE ROLE OF AUDIOGRAPHIC COMMUNICATION

While distance education is healthy within the province of Ontario, and although the government has clearly recognized the role distance education can play, there remains a significant barrier to distance education achieving its potential. That barrier is the traditionalist mindset, where distance education is seen as less desirable than traditional classroom-based instruction. This attitude exists within the minds of educational administrators, faculty, students and the community. They readily admit the need for and importance of distance education, but the bias that it is second best continues.

I submit that audiographic communication will serve to substantially address the deficiencies that have long be seen to be unavoidable in distance education, inadequacies such as low levels of interactivity, and slow interactivity. While other new electronic forms of distance education such as asynchronous computer-conferencing have significant potential in addressing these deficiencies, they are often under-valued, or even dismissed, by the traditional view that the best education occurs with a teacher standing before students.

However, the use of audiographics permits an 'emulation' of a traditional classroom environment. Everything (except for the ability to physically see one another) is there. The teacher is able to assume control of the class and the learning, and the level of interactivity has been increased to a much more acceptable level.

In order for distance education to truly achieve its potential, the following must happen.

- A broad array of equipment and media must be placed at the disposal of the teacher. Central to this should be audiographic capability.
- Effective, on-going teacher training must be available in terms of both teaching at a distance, as well as the use of various technologies. Teachers should be encouraged to utilize those media with which they feel most comfortable, and in ways which best complement the courses they are teaching.

There are doubtlessly a number of strategies for increasing the acceptability of distance education. Not the least of these is promoting its use to those who are not convinced of its potential by offering them an environment which is less foreign and more consistent with their educational beliefs. Here, audiographic communication and its successors as the technology continues to develop can play a significant role.

EVALUATION OF TELECOMMUNICATIONS-BASED EDUCATION
WHAT TO EVALUATE

Jeff Charles, Institute for the Future, U.S.A.

Dr. Charles spoke from viewgraphs, which are reproduced here. Prior to the viewgraph presentation, Dr. Charles, by way of preamble, addressed the nature of the problem telecommunications-based education tries to solve and the benefits of using this mode of delivering education. He then probed what to evaluate, including concept, context, content, and conclusions (outcomes, impacts). He then examined the nature of distance education in its various forms, including its disadvantages.

This was followed by a close look at the techniques that make distance education possible—narrowband as well as wideband technology. He stressed that the technologies, however sophisticated they may be, must be easy to use, easily accessible, reliable, convenient, and require a minimum of training.

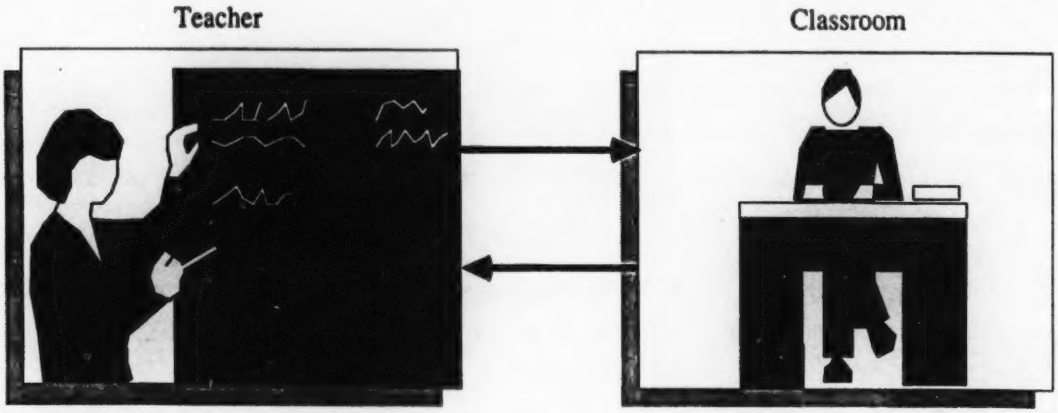
Because different stakeholders have different expectations from distance education, the speaker examined each type of stakeholder, e.g., foundations, government agencies, teachers, educators, and their typical objectives. He then spoke to several evaluation methods, including baseline, formative, and summative evaluation, used in evaluating distance education. It was particularly important in summative evaluation to uncover what worked, what did not, and why. Educators should note that success in this endeavor is hardly likely to occur unless several prerequisites are met. They include—teacher preparedness, student preparedness, support and advocacy from the school district, and training and local support.

Finally, Dr. Charles presented some summary statistics from one of the early trials of AT&T's Long Distance Learning Network which he had conducted for AT&T, which showed very favorable results for the concept of learning circles linked electronically for the teaching of classroom subjects.

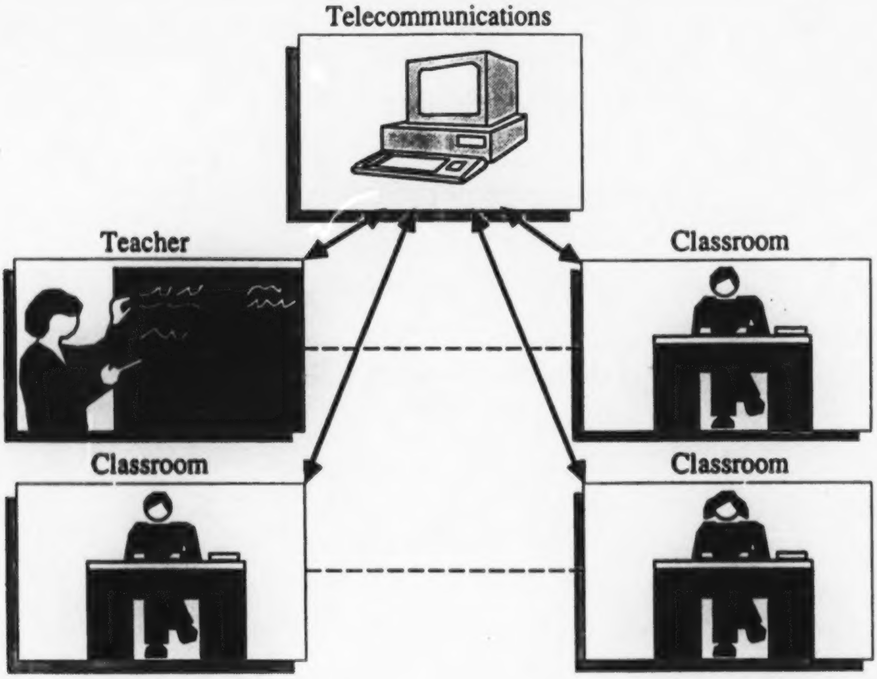
THE FOUR C's

• **CONCEPT**	Theoretical underpinnings
• **CONTEXT**	Implementation settings
• **CONTENT**	Education, enrichment
• **CONCLUSIONS**	Outcomes

TRADITIONAL


Teacher
Classroom

DISTANCE EDUCATION


Telecommunications
Teacher
Classroom
Classroom
Classroom

ELECTRONIC EDUCATION AMONG CLASSROOMS

Asymmetrical:	Instructor (with classroom)	to	Remote classrooms (teacher passive)
Symmetrical:	Classroom (teacher active)	to	Classroom (teacher active)

DISADVANTAGES OF DISTANCE EDUCATION

- Can be too impersonal
- Often requires behavior change
- Medium can become the message
- Unequal feedback

TELECOMMUNICATIONS

Narrowband	**Wideband**
• Audio only	• Video: ETV
• Electronic mail	• Multi-media
• Computer graphics	• Point to point
• Facsimile	• Point to multi-point

TECHNOLOGIES OF DISTANCE EDUCATION

ONE WAY FLOW

- Videotapes
- Audiotapes
- Print
- Conventional television

TECHNOLOGIES OF DISTANCE EDUCATION

INTERACTIVE

• Audio	— Telephone	
• Audio-graphic	— Facsimile, slides, handouts	
• Computer	— E-mail	
• Video	— Two-way — One-way	Satellite/microwave

TELECOMMUNICATIONS

- Easy to use
- Easily accessible
- Reliable
- Convenient
- Minimum training

STAKEHOLDERS: OTHER PUBLICS

Type	Who	Typical Objectives
• Sponsors	• Agencies, foundations	• Public policy issues
• Target group	• Students	• Learning; skills
• Implementors	• Teachers	• Effectiveness; professional growth
• School district	• Educators	• Encourage innovation; image
• Researchers		• Own agenda

BROAD EVALUATION STEPS

Type	Purpose
• Baseline	• Benchmark
• Formative	• Improvement
• Summative	• Impact

BASELINE

- **Background** — demographics, previous experience, etc.
- **Attitudes** — for/against
- **Expectations** — benefits, effort
- **Error potential** — possible pitfalls

FORMATIVE

- **Technology** — performance, reliability
- **Implementation**— problems, midcourse adjustments
- **Initial serendipity** — nature of early surprises

SUMMATIVE

What worked, what did not, and why

- **Impacts** — Learning
  - — Attitudes
  - — Benefits
  - — Technology
  - — Acceptance
  - — Satisfaction
  - — Problems, resolution
  - — Lessons
  - — Costs
- **Public policy implications**

SUCCESS PREREQUISITES

- Teacher preparedness
- Student preparedness
- School district support/advocacy
- Local training and support
- Demonstrable positive benefits

BACKGROUND

- Over 100 schools
- Over 200 teachers
- Over 1,800 students (U.S.)
  (Core schools only)
- Core/noncore schools
- School size — 330 to 3,318

STUDENTS: DEMOGRAPHICS

85% White

15% Nonwhite

58% Suburban

25% Urban

17% Rural

SOME RESULTS OF LDLN

- Students excited, motivated
- 85% of students want it to continue (n = 1,600)
- Teachers claim it enhances professional growth
- School districts, PTA, and others endorse it
- 75% learned class subject as well with LDLN
- Controlled for novelty effects

STUDENTS (N = 1,495):
Some perceptions of computers

	Yes	No
• Make use of a computer at school	86%	14%
• Have access to a computer at home	45%	55%
• Lack of computer ability — a disadvantage?	71%	29%
• Desire to communicate electronically with students in other schools	84%	16%

THE BULLETIN BOARD SOFTWARE EVALUATION INSTRUMENT: A SURVAY OF LEADING U.S. EDUCATIONAL TELECOMMUNICATIONS EXPERTS

Steven Isom, Allendaly County Schools, U.S.A.

Currently, there is very little research related to the operation of bulletin boards in the secondary school setting. There is no research which attempts to identify important characteristics of bulletin board software for the secondary school. At present no instrument has been developed to evaluate bulletin board software for the secondary school. However, there are articles which suggest characteristics that should be incorporated into any good bulletin board software package.

Like computers in recent years, the use of telecommunications and telecommunications software is certain to increase in our nations schools. Presently, only a small percentage of schools and school systems use telecommunications. As was the case with computers only a few years ago, educators and/or administrators will have to make, sometimes difficult choices about the type hardware and software which best meets their telecommunications needs. And like their choices with computers, some will base their decision(s) on the advice of a telecommunications literate educators or computer coordinators, while others will seek help from uninformed sources, others will not. Clearly, the mistakes made with the original introduction of computers into the schools could be made again regarding telecommunications, unless computer/telecommunications literate educators properly evaluate existing telecommunications software in light of their school systems present/future needs.

The purpose of this present investigation was to:
(1) Survey the opinions of 20 educational telecommunications experts in order to ascertain the major characteristics one should consider when evaluating bulletin board software for the secondary school (2) develop a bulletin board software evaluation instrument for the secondary school based on a national survey of educational telecommunications experts.

Relevant Literature and the Evaluation Instrument

Although no bulletin board software evaluation instrument could be found in either the literature or via interviewing leading educational telecommunications experts, it is worth noting related literature. Kerr and Hiltz (1982) identified 36 factors which should be considered when selecting system software. These 36 factors were categorized under six broad headings: (1) Learning (2) Adaptability (3) Behavior (4) Error control (5) Atmosphere (6) Specialized support software. Although bulletin board software is not necessarily system software, some factors they identify were also identified by this investigation. Many articles were found regarding software evaluation generally. Also, many articles have addressed the general aspects of telecommunications with microcomputers, particularly BBS. But, only a few recent articles specifically address bulletin board software. At present, no Bulletin Board Software evaluation instrument has been developed. Moreover, no BBS evaluation instrument has been developed for the secondary education arena.

Survey Instrument Description

B. Dodge and J. Dodge (1987, April) indentified 15 characteristics which should be considered before purchasing a BBS package, The first 6 were deemed as critical characteristics: (1) user friendliness (2) sysop friendliness (3) support XMODEM uploads and downloads (4) 1200-baud support (5) resistance to cracking (6) resistance to crashing. They identified 9 non-critical characteristics: (1) subboards (2) muliple levels of access (3) searching by threads (4) customizability (5) remote maintainability (6) intersystem communication (7) local familiarity (8) ability to run on an older computer (9) modemless training. This article described several factors to consider before purchasing either terminal or BBS. The Dodge and Dodge (1987, December, 16) and Rogers (1987, December, 14) served as the starting point for the development of the survey instrument used in this study.

The first assumption underlying the development of the evaluation instrument used in this study was, the fact that the BBS evaluator, probably a district computer coordinator, would have a limited time for the evaluation process and would not tolerate a lengthy evaluation instrument. Therefore, the instrument is succinct, only addressing a few important specific points followed by questions concerning the broad characteristics as identified by the telecommunications experts. Secondly, it was assumed that BBS will undergo rapid change in the near future. Certainly, the instrument cannot anticipate the future. At least, no more than most people can correctly foresee changes in the stock market. So, to make some allowance for unknown features which will inevitable accompany the evolution of BBS, non-specific questions were included for each of the 15 characteristics. Preceding these general questions are a few specific questions - - subcategorical questions - - related to the particular characteristic under evaluation.

Data Collection

The data were derived primarily from two sources: (1) feedback from the 20 telecommunications experts during the interview process (2) feedback from 10 high school teachers on the clarity and format of two versions of the BBS Evaluation Instrument.

After reading the article by Dodge and Dodge (1987), along with literature related to software evaluation and doing an initial telephone interview with Rogers and Dodge regarding the nature of the research, a list of 12 characteristics or qualities related to issues surrounding the role of BBS in the secondary school setting was compiled: (1) user friendliness (2) sysop friendliness (3) protocol checking (4) baud rate (5) resistance to cracking or unauthorized use of the board (6) resistance to crashing (7) subboards (8) customizability (9) remote maintainability (10) intersystem communications (11) ability to run on a variety of computers (12) modemless training. This initial instrument later evolved to include 15 characteristics: (13) conferencing (14) multiline capability (15) instructional capabilities.

Unlike most surveys which use anonymity as a corner stone for validity, this survey's findings are strengthened by virtue of the recognized expertise of those involved. All 20 experts where interviewed via a telephone survey. Following the first telephone interview of two individuals who are currently in the forefront of educational telecommunications nationally, the first draft of the survey instrument was constructed. The instrument allowed for appropriate background information, i.e. name, date, current position. Also, the instrument allowed for additional telephone contact(s) with each expert by providing space for the interviewer to record his/her home and/or office phone number. Next in the survey instrument format comes the statements read to all those interviewed. The first series of statements gave the interviewee an idea of what type information would be requested and the purpose of the survey.

The Evolution of the Survey Instrument and Methodology

The original survey instrument which grew out of the article by Dodge and Dodge (1987, April) and interviews with both Dodge and Rogers was modified after the eighth expert was interviewed. This modification resulted from the survey methodology. The method of questioning was informal to allow for as much flexibility on the part of the interviewee as possible. As part of the questioning, the one question which was systematically asked of each interviewee although it does not appear on the survey form per se was, "Do you think I have left off any major characteristics? If so what are they?" Also, aside from the questions stated on the survey instrument the interviewer periodically asked the interviewee if the format of the question as stated under one of the major characteristic heading, i.e. yes-no, true-false or Likert scale seemed appropriate(Likert,1932). The intent here being to accrue a consensus regarding the appropriate format of the BBS Evaluation Instrument, the end product of the survey instrument. In several cases an individual was interviewed two or three times, in other cases, the interviewees simply took more time to address the qualities under question than others.

Findings From the National Survey

Upon examining the data in a descriptive format, three categories of data were identified: (1) agreed critical (2) agreed non-critical and (3) disputed characteristics. Categories 1 and 2 are the characteristics about which at least 70% of the experts agreed, characteristics they deemed as either critical or non-critical. Data category 3 is defined as characteristics on which less than 70 % of the experts agree. In examining the results of the survey it is important to remember that all 20 experts have agreed that the 15 characteristics listed by the survey instrument are important when evaluating telecommunications software for inclusion into the secondary school setting. In 10 of the instances, 70% or more of the experts are in agreement regarding the classification of the characteristics as either critical or non-critical.

Of the 10 areas of agreement, 5 (data category 1) were deemed critical: (1) user friendliness (95%), (2) protocol checking (95%), (3) cracking (85%), (4) crashing (90%), (5) customizability (70%). Ninety-five percent of the experts agreed characteristic A, user friendliness and C, protocol checking are critical characteristics to be considered when evaluating BBS for use in secondary education. The next largest consensus of opinion hinged on questions related to characteristic F, resistance to crashing. Ninety percent of the experts agreed that resistance to crashing was a characteristic which must be carefully scrutinized when reviewing BBS regardless of application. Characteristic E, resistance to cracking or unauthorized use, addressed the issue of bulletin board security. Even though 85% of the experts agreed that bulletin board security was critical, others (15%) were very vocal in regard to possible negative consequences of such security. The minority group expressed concerns about bulletin board security acting as a barrier to the free flow of information. Seventy percent of the experts agreed that characteristic H, customizability was critical, while the remaining 30% indicated it would be non-critical, albeit desirable. Five (data category 2) characteristics were judged as non-critical by a majority of the experts: (1) ability to run on variety of computers (70%), (2) modemless training (95%), (3) conferencing (70%), (4) multiline capability (70%), (5) instructional capability (90%). Ninety-five percent of the experts agreed that characteristic L, modemless training was non-critical. Some of the experts expressed the opinion that modemless training was virtually useless unless circumstances were such that no modem or other equipment necessary to set up and properly operate a bulletin board were available. Ninety percent of the experts agreed that instructional capability was important but not critical. However, some experts did express the opinion that this characteristic may become more and more critical with the proliferation of computer hardware and improvements in BBS. Seventy percent of the experts agreed that characteristics K (ability to run on a variety of computers), M (conferencing) and N (multiline capability) were nice features, but at present, not critical. A number of the experts expressed the opinion that their present classification of any and/or all of these characteristics may tend to shift from the low end of the non-critical category to the critical. Again, many of the experts who classified these 3 characteristics as non-critical indicated that their opinions might change in favor of the critical category on a number of characteristics in the future. The remaining characteristics were in dispute. Sixty-five percent of the experts said that sysop friendliness and remote maintainability were non-critical characteristics which should be evaluated when reviewing BBS for the secondary school setting, while 35% thought it to be a non-critical characteristic for bulletin board software (BBS) in the secondary school. Of the 15 characteristics evaluated by the survey instrument 10 are clearly either critical or non-critical. The remaining 5 characteristics are somewhat in dispute.

Discussion

This survey research has served to: (1) identify 15 general characteristics on which 20 educational telecommunications experts have agreed should be included in an evaluation instrument of BBS for use in the secondary school setting, (2) discriminate between critical and non-critical characteristics of BBS for the secondary school setting, (3) provide a basis for the development of a BBS Evaluation Instrument for the secondary school setting, (4) elicit relevant information from national leaders in the field of educational telecommunications; thus supplying additional insight into the parameters of BBS evaluation generally, and BBS evaluation for the secondary school in particular, (5) provide information regarding the appropriate format of an evaluation instrument designed to evaluate BBS for implementation into the secondary school setting.

It is interesting to note the percentage of agreement/disagreement between the experts regarding category 3 type questions. For instance, sysop friendliness seemed to be a point of dispute with 65% of the experts classifying it as critical while 35% classified it as non-critical. The percentage splits of 40%-60%, 60%-40%, 65%-35% and 35%-65% represent baud rate, subboards, remote maintainability, and intersystem communications respectively. Interestingly, there were no 55%-45%, 45%-55% or 50%-50% type in--splits on any of the 15 characteristics. Why? During the course of the interviews the questioning technique encouraged open ended answers as much as possible, so the interviewer could gain insight into the interviewee's perspective regarding telecommunication and his/her idea(s) regarding the role of bulletin board software in the educational setting. Often, the conversations tended to wander onto tangentially related topics, topics frequently associated with their current work situation or past experiences dealing with hardware and/or software related to telecommuinications and BBS in educational settings. It seems that the difference between the groups, one emphasizing the non-critical, is type background. The individuals who ranked category 3 questions as non-critical seemed to possess more technical expertise, i.e. programming experience, software production experience, etc. Those individuals who had been involved with telecommunications and BBS for several years were accustomed to modifying the BBS to meet their own needs and tended to think it would not be difficult for the computer literate teacher or computer coordinator to do the same. In re-examining the interview tapes, it seems that familiarity with bulletin board programs and technical expertise of the interviewee lead to the differences on the category 3 type characteristics. Those experts who seemed to possess a high degree of technical expertise tended to rank many characteristics as non-critical in comparison to the less technically experienced group.

The tangential dialogue which resulted from the open-ended type questions also provided useful information regarding current and possible future trends and developments in educational telecommunications. Since these discussions are not a major focus of the present study, no elaboration is presented. Another interesting, yet peripherally related issue revealed by this survey were problems frequently associated with the adoption and implementation of telecommunications hardware/software in the educational setting.

Format

The format associated with the BBS Evaluation Instrument for the Secondary School is derived primarily from three sources: (1) feedback from the 20 telecommunications experts via interview process, (2) literature supporting the use of the Likert Scale, (3) feedback from 10 high school teachers on the clarity and format of two versions of the instrument.

Feedback from Experts

The experts were queried about the appropriateness of the survey instruments question format. Of those questioned, 100% agreed with the question format as it was presented to them. For instance, after the investigator read the question as it appeared in the format given by the survey instrument the experts were asked if it would be more appropriate to present the question in another format i.e. yes-no,fill in the blank, Likert Scale, etc.

Literature Review: The Likert Scale

The Likert Scale is one of the most commonly used methods of measuring attitudes and opinions. The Likert Scale has been used in many local, regional, state, national and international surveys.

Feedback from High School Teachers

After collecting data from the telecommunications experts the investigator constructed two versions--Form I and II--of the same BBS evaluation instrument. Ten high school teachers selected from different departments of the same high school were asked to review both Form I and Form II and follow the directions as given on the Teacher Field Test Review. Also, they were requested to jot down any suggestions that could both clarify the BBS evaluation instrument and make it easier to use in a practical situation. The data collected revealed: (1) that approximately 50% of the teachers surveyed had computer experience, (2) most of the teachers used a computer in conjunction with their school work, (3) they preferred Form II, (4) agreed the instrument could potentially provide them with practical means of evaluating BBS, (5) 90% agreed the instrument was of the proper length and (6) that 100% of those surveyed agreed that the questions were stated clearly.

Validity and Reliability

It may be reasonably assumed that the instrument possesses a high degree of content validity via the 20 telecommunications experts. It would be difficult to address the question of construct validity without some sort of comparison with a similar instrument. A degree of reliability is indicated via the consistency of responses given. As noted earlier, there were no 50-50 splits on any of the 15 characteristics.

Conclusions and Implications

The BBS evaluation instrument resulting from this national survey of 20 telecommunications experts provides a starting point from which a computer/telecommunications literate teacher, computer coordinator, or interested computer user can evaluate BBS. This national survey: (1) targeted those individuals with expertise in both telecommunications and education, (2) elicited information from the experts which resulted in 15 major characteristics they deemed as critical or non-critical with respect to the use of BBS in a secondary education setting. Although the survey focused on the use of BBS in education, it does not preclude or limit the use of the resulting instrument to secondary education alone. Certainly, most of the characteristics would remain largely the same despite the field of application.

Before using the BBS Evaluation Instrument, it is imperative that the evaluator set forth a list of clearly stated goals and objectives for his/her particualr environment. This list should be used to determine the degree of importance a particular characteristic or specific subcategorical question has in relation to the stated goals and objectives.

The results from this study have provided a:

1) succint BBS Evaluation Instrument targeted for secondary education.

2) succint BBS Evaluation Instrument which may assist in the evaluation of BBS in areas other than education.

3) basis for development of more specialized BBS Evaluation Instruments.

4) platform for the current concerns and opinions of leaders in educational telecommunications.

Author Notes

The author would like to acknowledge the invaluable advice and assistance of the 20 telecommunications experts who participated in this study:

Tony Anderson
Charles Bitzstein
Bernie Dodge
Ann Erickson
Jim Erwin
Larry Hannah
Paul Hanpel
Dennis Harkins
Beverly Hunter
Holly Jobe
Erica Lodish
Stephen Longo
Joe Petrone
Al Rogers
Len Scrogan
Bob Shayler
Jerry Shedlosky
George Willett
Richard Winn
Sue Zeller

In particular, I would like to thank two of our nations leaders/pioneers in the field of educational telecommunications, Bernie Dodge and Al Rogers for the many hours of consultation regarding the development of the survey instrument and the resulting BBS Evaluation Instrument.

Table 1

	Category 1 agreed critical	Category 2 agreed non-critical	Category 3 disputed
1.	user friendliness	ability to run on a variety of computers	sysop friendliness
2.	protocol checking	modemless training	baud rate
3.	resistance to cracking or unauthorized use	conferencing	subboards
4.	resistance to crashing	multiline capability	remote maintainability
5.	customizability	instructional capability	intersystem communications

Footnotes

1. The specific points referred to here are also referred to later in the text as specific subcategorical questions related to the general characteristic being addressed.

2. Low end here refers to the neutral and/or negative comments made by the interviewee concerning a particular aspect of a BBS characteristic presented via the survey.

POSSIBLE CONSEQUENCES OF ELECTRONIC NETWORKING FOR EDUCATION

Erich Neuwirth, University of Vienna, AUSTRIA

Many people living in a commercial or in an academic environment already experience changes in their working style caused by the availability of electronic networking facilities. Most of them see that the new media available will have noticeable impact in any kind of work related to knowledge and/or information.

So we have to consider the implications of these new technologies for a possibly changing attitude of the society with respect to knowledge and information. Since the main task of every educational system is preparing the students to deal with those concepts we can see immediately that we think about the role of the new technology in our educational systems.

Telecommunications is not yet a well defined term, so we will look at different ways of using telecommunications tools for enhancing classroom projects.

First of all we have to decide at which level we want the communication to take place. Possibilities include institutional, individually at the teacher level, groupwise at the students level and individually at the students level.

We also have to decide how we want the communication to take place: in a formalized way integrated into the curriculum or informally and spontaneously.

We also can differentiate projects according to the underlying principle, namely if the partners will be contacted only to help to find answers to questions arising in different studies locally or if the main objective is to build up a "joint body of knowledge".

Telecommunications at the moment offers two main areas of information exchange: requesting information from centralized databases or directly communicationg with other partners. Ways of using these two different aspects of telecommunication in an educational framework also differ widely

The use of "online-databases" is more simple to implement because we just have to find out which databases are available and then consider which ones of those can be used with educational benefit.

Using partner-to-partner communications is more difficult in the sense that this learning medium is so new that we have to design projects which will bring benefits to our educational system.

Let us give examples for both kinds of projects:

At the moment Austria has a project to setup a database of statistical data like age structure or the incidence of different diseases in the regions of the country. This database will be set up in connection with the Central Statistical Office, so the data will be relatively up-to-date. Schools will have access to this database. Schools also will have a program for representing these regionalizaded data as maps. So geography teaching now has the added possibility of using recent data sets and presenting them as thematic maps. The main advantage is that up to now teachers only could use maps in books which were out of date rather soon and they could not produce new maps with interesting data sets if these maps had not yet been printed already. So in some sense this project makes it possible to come up with interesting questions and being able to find answers also to new questions. Without the tools of telecommunications in this context one could only get answers to questions somebody else also had thought of previously. The teacher still has to decide how much the students will be involved in dealing with the technology-related aspects. He might decide to download the relevant data himself and produce the maps himself and only give paper material to his class, but he also might decide that the students should be involved in downloading the data and in producing the maps with microcomputers. This decision is not a purely technical one, they main difference between the two ways of handling such projects in a philosophical one: do we consider the new technology mainly as an aid for teaching or mainly as an aid for learning
.

It also is important to notice that in this kind of project the didactically new concepts lie in dealing with specific subject areas and to use telecommunications as a tool. The emphasis should not be put on the skills of using telecommunications equipment but on the process of retrieving information and transforming it into new knowledge for the students.

Now let us look at a more partner oriented project with regard to telecommunications. Just at a moment a joint project between an Austrian and an US school is in the planning phase. The task for the students will be to write a report about the country the partner group is living in. Students will not start with telecommunications, but will use classical media like schoolbooks or encyclopedias to find out as much as possible about the partner's country. But there will remain unanswered questions and students will be allowed to pose these questions to their partners in the other country. This approach has the main advantage of demostrating the possibilities of telecommunications as an additional tool for retrieving information, not as a replacement for existing technologies.

From already existing (commercial and academic) networks it is known that such systems do now work too well in some of the parties have the feeling that they have to do all the work. This would happen if we would allow the students to ask their questions without making local inquiries before. But since they have to accumulate knowledge before asking the questions the respective partners most probably will have the feeling of dealing with competent students and that should help in successfully finishing such projects. It is also important that during this project both sides play the questioning and the answering role. So nobody will have the feeling of just helping other people without having benefits for himself.

These examples are mainly concerned with direct student work. We have. however, also to prepare future teachers to be able to use these new learning and teaching resources for the benefit of our educational systems. So while starting projects in teacher training. Some of the projects should students. Teacher students should gain experience themselves about the uses of telecommunications. But the best way to demonstrate benefits of technical devices is using them within areas of interest of those supposed to become acquainted with the new technology. Areas of of interest of teachers and pupils might be similar in some respects, but there also are differences. So it might be very useful also to do some project work where teachers students deal with questions and problems mainly concerning themselves. As an example (and this is being done in the PLUTO project) we can link teacher student groups in differet countries and have them exchange data about their social situation like the income and expenses of students in the respective countries, conditions of housing, local eating habits and traffic conditions for reaching the institution they are studying at.

These kind of projects will involve the students in the use of telecommunications and probably seeing telecommunications as a means of getting answers to questions of personal interest also will help the new teachers to see the technology as a general means to acquire knowledge not only in projects specially devised to demonstrate the use of telecommunications in direct school setting.

Another kind of project might be on a "metalevel" enabling educational decision makers and curriculum developers to exchange ideas in a rather informal way. One of the difficulties of using NIT (new information technology) in school is that the circumstances are changing very rapidly. Telecommunication is an important aid in exchanging new information. Hearing experiences about the use of computer programs for learning and teaching different subject areas can be very helpful. Having a network for teachers and curriculum developers discussing these issues can help to gain access to experiences otherwise almost unavailable all the people involved. PLUTO also is preparing a pilot project about the use of software in mathematics teaching.

Possibilities in these areas include exchanging experiences, jointly preparing lessons plans, jointly developing educational material including software and courseware and even joint curriculum development.

If we try to classify posible central areas of interest for telecommunication in education we can look at at least three main topics:

Information handling skills

Communications skills

Foreign language skills

Information handling skills mainly are concerned with the thinking style and structure of the persons involved. The "statistical map" project described earlier concentrates on these aspects. We also might say that projects of this kind help the students to "extend their personal toolkit".

Enhancing communication skills involves the insight that this new tools not only can be used as a private tool but also as a means to have more and different kinds of communication with people who otherwise could not be contacted easily. Additionally this implies some discussions that the man-machine interface of computers and the user interface of different programs also is not a purely technical problem but a problem of communication beetwen the program designer and the program user.

Foreign language skills naturally are required in international projects. Students immediately see the need of foreign language skills in a "professional" context. Since international collaboration seems to become more and more important in many aspects of daily and professional life it is very important to give students chances to experience this fact already while still attending school.

These examples should show that telecommunications can be implemented with different goals on different levels. Since telecommunications skills will be a requirement for professional careers in the future we will have to use it in our educational systems anyhow. But we still have the option of designing the projects in such a way that we can make the best use of this new technology not only in a technical sense but also in a more philosophical sense of extending the personal toolkit of our students with regard to their skills dealing with information retrieving and processing.

EVALUATION OF LOCAL NETS FOR UPPER SECONDARY SCHOOLS

Goran Nydhal, National Board of Education, SWEDEN

In Sweden a modern upper secondary school has study programmes for both theoretical and vocationally oriented education. Use of computers is a part of education not only because it reinforces the theoretical elements, but also because it provides vocational courses with a more modern content. Normally computer training takes place in a computer room with 15 computers. Upper secondary schools usually have more than one computer room and many schools are gradually trying to distribute their computers by means of a net to different parts of the school.

1. Goals

This work has as its goal the study of different local net-works against a number of requirements formulated on the basis of the upper secondary school's teaching. Some examples of this are:

- The system shall consist of at least 15 workplaces.
- The system should be able to manage at least 500 user identities, so that every user (student) can log on (connect) to his own directory. This should be capable of being protected by a password.
- The system should be able to administer its users in groups through a group leader (teacher), who when necessary can go into the different directories of the group.
- The system should be easy to administer for those responsible in the school.
- After logging on to the system a new menu should appear, from which the different applications in the system can be accessed.
- All the workplaces should have access to good graphics (EGA graphics).
- The system should be able to simultaneously run 3 printing units (printer/plotter), which can be accessed from any workplace at the same time.
- It should not normally take more than a max. of 60 seconds to load a programme into all 15 workplaces.

2. Implementation

A number of computer suppliers were invited to give a practical evaluation of their system. This was done during January - March 1989 in premises provided by suppliers in Stockholm or in the immediate vicinity.

The following suppliers and systems participated in the practical evaluation:

1. Commodore Svenska AB with system Novell Advanced Netware 286 (ver 2.12) - Western Digital Ethernet
2. IBM Svenska AB with system PC LAN Programme (ver 1.31) - IBM Token Ring Network
3. Nokia Data AB with system 3COM3+ (ver 1.3.1) - 3COM Etherlink Plus
4. TIKI-DATA AB with system Novell Advanced NetWare 286 (ver 2.12) - D-Link
5. Victor Svenska AB with systems
   A. NovaNet (vF.0.09) - D-Link
   B. Novell Advanced Netware 286 (ver 2.12) - G/Ethernet

3. Judging and testing the systems

The systems consists of 15 workplaces which through a card in every computer and via a cable are connected to a server with a common mass memory (hard disks) and with printers. Since the workplace computers are basically identical for the different systems, evaluation has focussed on the network. These are based on two elements:

- Net hardware or physical net (net card and cable)
- Net operating system.

Three of the suppliers are offering the same network operating system in the same type of net but with different net cards. It is not easy to draw any distinctions between the different physical nets. However, the net hardware presented in this evaluation are among the best available.

The differences between the physical nets touched on above, are not in themselves sufficient to draw any conclusions. The more obvious differences observable between the nets are relate in the first instance to differences in the net operating system and secondly into how the system has been configured.

The figure below shows the combinations "physical net - net operating system" offered by the suppliers.

	NET OPERATING SYSTEM			
PHYSICAL NET	3Com 3Plus	IBM PCLP (1	Novell Netware	Victor NovaNet
3COM EtherLink Plus	Nokia		X	
D-Link Ethernet			Tiki	VictorA
G/Ethernet			VictorB	
IBM Token Ring	X	IBM	X	X
WD EtherCard Plus			Commodore	

Note: (1 PCLP = PC LAN Program

3.1 The Basis for the Evaluation

The evaluation is relative. The systems have first been ranked in terms of 9 different features and then receive a place number ranging from 1-4. Based on this a number of points have been allocated based on subtracting the place numbers from the number 4. The first 4 features regarded as being the most important for the school have been given double weighting.

3.1.1 Performance

This evaluation is based on the time taken to load not only a large word-processing programme but also AutoCad into 15 workplaces simultaneously This is shown after the summary of the results. Both NetWare and 3Plus are well under the requirement specification of 1 minute for both programmes. NovaNet manages the word-processing limit. Whilst PCLP exceeds the limit for both programmes.

1: 3Plus, NetWare 3: NovaNet 4: PCLP

3.1.2 Security

Out of a number of possible security aspects, only security regarding unauthorized access is treated here, as this is significantly more important for the schools than the others. There are advanced "hackers" at every school who regard every security system as a challenge. In practise NetWare has demonstrated it has the best security, due to its use of a proprietary file format on hard disks. This makes it impossible to access the hard disk through DOS, which has limited (if any) built in security. NetWare in addition provides the possibility of other security features, it is, for example, possible, to limit log-on attempts to certain times and workplaces as well as in other ways. 3Plus is regarded as being a class above PCLP and NovaNet. One reason is that it uses its own specially designed server. Otherwise it is this which is the weakest link in the DOS-net.

1: NetWare 2: 3Plus 3: PCLP, NovaNet

3.1.3 Administration

This evaluation covers the possibilities for a system administrator to maintain the system in good working order. This applies to both the functions of the system and the work input needed to operate these. Administering a net involves both registering new users, servicing existing users, installing and maintaining programmes as well as making back-up copies and maintaining files and directories. All the systems evaluated now have relatively easy--to-use menus and it is easier to see the similarities rather than the differences in terms of their administration. NetWare and NovaNet are superior to the others in one significant respect, namely that an upper limit can set to the amount of space allocated to a user on the hard disk. This prevents students from "overstretching" themselves and in a short time using up large segments of memory. This has been one of the prime sources of difficulty for most system administrators. Another advantage is the ease of creating, administering and maintaining a large number of users by means of text file templates. In addition, NetWare has a number of other unique features for system administration and monitoring in its "accounting" mode, entitling it to first position.

1: NetWare 2: NovaNet 3: 3Plus, PCLP

3.1.4 Memory Capacity

The first computer with MS/PC-DOS had 64 Kb primary memory, which at that time was regarded as unnecessarily excessive. The fact that the operating system could only handle 640 Kb was not regarded as a limitation. Increased user requirements as regards programmes mean that this is no longer the case. The most memory demanding programmes have been those using the Windows operating system, CAD and DTP programmes, all of which need around 500 Kb to work satisfactorily. The operating system has also increased in size. In one workplace on a network, DOS itself needs more space than in a single-user system and of the remainder one part is needed for the workplace element in the network operating system. The amount left for applications programmes is important and in certain cases crucial in determining whether or not a programme can be run. Both 3Plus and NetWare leave around 515-520 Kb free, somewhat greater than the 512 Kb generally thought of as the critical value. The reason for this is that 3Plus uses EtherLink Plus network cards which can hold a part of the network system in memory and that NetWare uses version 3.3 of DOS. NovaNet leaves just over 500 Kb free. PCLP leaves only 460 Kb free for applications programmes. One reason is it uses DOS version 4.0 which needs roughly 20 Kb more than version 3.3, but even then there is still a bit to go to 500 Kb. It should be pointed out that although these values are approximate, they have been recorded after suppliers have been given the opportunity to optimize the system for maximum space.

1: 3Plus, NetWare 3: NovaNet 4: PCLP

3.1.5 Hardware Support

If a system is chosen on the basis of functionality and performance, the network operating system is fundamental. On the other hand if the question is which physical net should be chosen, then it is an advantage if there are a number available since different systems have different characteristics. It is also better to choose a physical net that is supported by a number of network operating systems, since it would be significantly simpler and cheaper to change the network operating system in the future than to change the physical net itself. The table above shows which of the net cards evaluated are supported by the network operating systems. A look at the other network cards on the market, makes the difference even clearer. NetWare supports around 30 cards. Amongst these are most types of net, not just the standards but also proprietary makes. NovaNet's only requirement that there should be drive routines for Netbios, which many net cards have. NovaNet also covers a spectrum of different net types. 3Plus supports in addition to 5 own 3Com cards also IBM's Token Ring and thus covers the two most common standards, Ethernet and Token Ring. PCLP supports IBM's own, which in principle amounts to three. On the other hand only Token Ring is a standard.

1: NetWare 2: NovaNet 3: 3Plus 4: PCLP

3.1.6 Standards

There are three reasons as to why standards are important:

- They reflect the current state of knowledge about and the existing way of regarding the technology the standard incorporates,

- they give the user the opportunity of obtaining products and services from more than one manufacturer, which increases the range of choice, provides better products and lower prices,

- they make it possible for manufacturers to develop new products and services using the security of standards as a basis

None of the network operating systems evaluated use ISO standards (unlike net cards) but all say they support the market standard developed by Microsoft and IBM, which can be put under the category of MS-DOS 3.1 and Netbios. PCLP and NovaNet follow these completely, but 3Plus and Netware deviate through having their own operating system in the server. NetWare also deviates by having its own file format

1: NovaNet, PCLP 3: 3Plus 4: NetWare

3.1.7 Modularity

Of interest in the future is how the school's net will fit into a larger concept, in an environment with a number of computers and computer systems in both local and global nets. The term modularity refers to how well the net operating system fits into such a concept, how well it is supported, principally on the communications side as well as the possibility of integrating the net in an environment with both mainframes, minicomputers and other PC nets. 3Plus, NetWare and PCLP all have their strong points. 3Plus has established a name on the communications side, above all when it is a question of linking PC's into other computer environments. There is a wide range of communications products around NetWare, unbeatable when you want to connect different types of PC nets together. PCLP is wellintegrated in the IBM concept, and has in that area very strong support, which has not been equally well developed in other environments. NovaNet is a new and untested product which despite its Microsoft origins is neither a part of a comprehensive product range as PCLP is, nor does it have a user base as does NetWare. A difficult choice.

1: 3Plus, NetWare, PCLP 4: NovaNet

3.1.8 Flexibility

A network operating system works with users on the one hand and with access on the other. An important feature of any system is how these two elements are structured and how this is handled on both the logical and physical levels since these determine the limits to the functionality of the system. NetWare has advantages over the others in terms of a wider spectrum of access rights and a greater freedom of choice when it comes to distributing these. NetWare and NovaNet have advantages over the others for handling groups. In addition NovaNet is a so-called volume net, which is a "net within a net". It works with a logical structure different from the normal DOS directory structure, and makes possible amongst other things the handling of programmes which otherwise would be difficult to get working together in a net environment. There are a number of programmes on the market handling systems that create difficulties for the net. For example some programmes written in Turbo Pascal use a somewhat unorthodox way of opening files. One of these - "The Nuclear Power Simulator" - was tested and worked only in NetWare and NovaNet satisfactorily. 3Plus comes ahead of PCLP because it provides additional possibilities for determining access.

1: NetWare. 2: NovaNet 3: 3Plus 4: PCLP

3.1.9 Price

The school's resources are limited, and even if the network operating system only accounts for a fraction of the total investment, the cost aspect is not unimportant. PCLP provides the lowest price for a system with 15 workplaces, under 5.000 SEK while 3Plus comes next just under 10.000 SEK. NovaNet costs just under 20.000 whilst NetWare is the most expensive at around 35,000 SEK. (1$ = 6 SEK)

1: PCLP 2: 3Plus 3: NovaNet 4: NetWare

3.2 Ranking Position and Points

As may be seen from the table on the last page, suppliers with the same equipment have succeeded in optimizing their systems with varying degrees of success when it comes to time based performance criteria. TIKI has the fastest net.

	3Plus	NovaNet	Netware	PCLP
Performance	1 (6p)	3 (2p)	1 (6p)	4 (0p)
Security	2 (4p)	3 (2p)	1 (6p)	3 (2p)
Administr.	3 (2p)	2 (4p)	1 (6p)	3 (2p)
Memory requi.	1 (6p)	3 (2p)	1 (6p)	4 (0p)
Hardware supp.	3 (1p)	2 (2p)	1 (3p)	4 (0p)
Standards	3 (1p)	1 (3p)	4 (0p)	1 (3p)
Modularity	1 (3p)	4 (0p)	1 (3p)	1 (3p)
Flexibility	3 (1p)	2 (2p)	1 (3p)	4 (0p)
Price	2 (2p)	3 (1p)	4 (0p)	1 (3p)
Total:	**2 (26p)**	**3 (18p)**	**1 (33p)**	**4 (13p)**

(NB. The first four features receive double-weighting.)

Based on the above, the systems are ranked as follows:

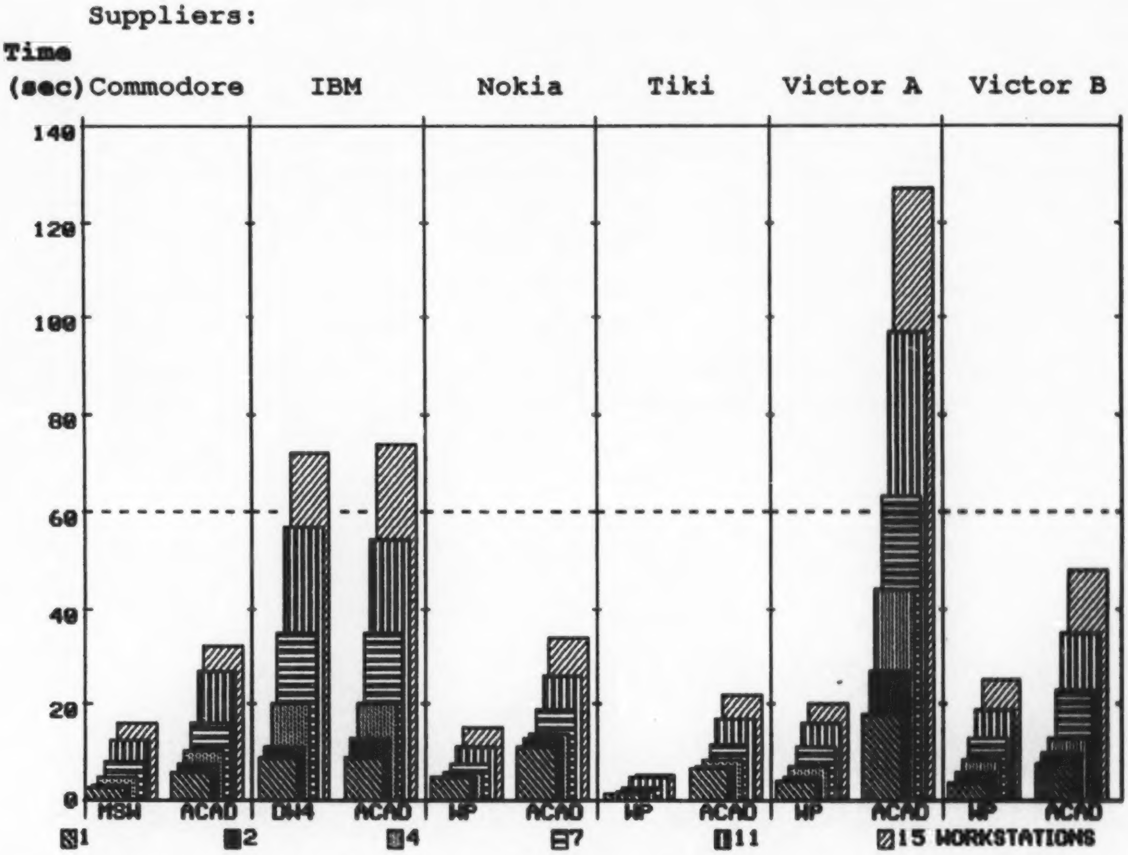
1:	**Novell Advanced NetWare** v2.12 Supplier: Commodore, Tiki, Victor	33 points
2:	**3Com 3+** v1.3.1 Supplier: Nokia	26 points
3:	**Victor DataNova NovaNet** vF.0.09 Supplier: Victor	18 points
4:	**IBM PC Local Area Network Program** v1.31 Supplier: IBM	13 points

DIAGRAM

Time taken to load a program into 1, 2, 4, 7, 11 and 15 workstations simultaneously

Left bars each column: Large word processing program

Right bars each column: CAD program (AutoCad)



The readings apply to the following configurations:

	Network OS	Physical net	Word proc. program
Commodore	Novell Netware	Ethernet	MS Word
IBM	PC Netw. Progr.	Token Ring	DisplayWrite 4
Nokia	3COM 3+	Ethernet	Word Perfect
Tiki	Novell Netware	Ethernet	Word Perfect
Victor A	NovaNet	Ethernet	Word Perfect
Victor B	Novell Netware	Ethernet	Word Perfect

4. Summary and conclusions

Modern local nets give the school the opportunity of building up a stable and good system which can be located in the computer room or elsewhere in the school as and where needed. The systems can be configured so that a normal user can easily work from any workplace with programmes of his choice.

Some of the systems work with imposing speeds. In the case of the Novell Advanced NetWare on D-Link physical net, Word Perfect 4.2 (250 Kb) was loaded into 15 workstations in 6 (!) seconds. It actually takes longer to load Word Perfect from a local hard disk on a single-user station.

These speeds means that without difficulty CAD programmes can be run in the net. Tiki showed that AutoCAD could be loaded into 15 workstations in about 21 seconds. This makes possible an expansion of teaching in CAD, since not only can the programme be run in the computer room, but the programme and data files can used in the workshop at a workstation connected to the net.

Programmes for the administration of the local nets have become better. However, additional functions would be desirable to make the administrator's work easier.

On the market a certain de facto standard is beginning to appear for both network operating systems and for physical nets. The leading network operating systems are according to the evaluation group's evaluation Novell Advanced NetWare and 3COM Plus. At the moment Novell has a certain advantage in the market.

The leading physical nets are Token Ring and Ethernet with different speeds and cables. At the moment Ethernet seems to dominate for connecting both small and large computer systems.

It is important that the schools invest in one of the standards developed for the physical net. The schools' costs, despite a somewhat higher initial cost, would be then lower over time.

LIST OF CONTRIBUTORS

Abir Adi

Kav-Manhe Inc., 22 Yavne St., Tel Aviv 95791, ISRAEL

Alter Miryam

Manhattan Day School, 310 West 75th Street, New York, NY 10023, U.S.A.

Annina Ralph

Baldwin Public Schools. Milburn Ave & Hastings St.,
Baldwin, N.Y. 11510, U.S.A.

Applegate Kent

Stuttgart American High School, APO, NY 09279, U.S.A.

Bieber Jacques

IBM Int. Educ. Cent., Chaussee de Bruxelles 135 B1310 La Hulpe, BELGIUM

Biilmann Ove

Royal Danish Sch. of Educ. Stu.,Emdrupvej 101,2400 Copenhagen NV
DENMARK

Boucher Terry

Program Planning and Development, Ind. Learn. Ctr., Ministry Of Educ.
909 Yonge Street, Toronto, Ontario M4M 3G2, CANADA

Calvin Sam

P.O.B. 4435, APO New York 09633, U.S.A.

Cameron John

Project Special Link resource Teacher, North York Board of Education
10 Allenwood Crescent, Willowdale, Ontario M2J 2R2, CANADA

Castells Jordi

XTEC Project, Programa D'Informatica Educativa, Avgda F. Cambo 21, 4RT
08003 Barcelona,SPAIN

Chapple David

Computer Pals, Across the World, P.O.B. 280 Manly, AUSTRALIA

Charles Jeff

Instit. for the Future, 2740 Sand Hill Rd, Menlo Park, CA 94025, U.S.A.

Chasid Moshe

Center for Jew. Educ. in the Diaspor, Bar Ilan Univ., Ramat Gan, ISRAEL

Copen Peter

357 Huinterbrook RD., Yorktown Hts. N.Y., U.S.A.

De-Jager Nico

Univ. of Port Elizabeth, P.O. BOX 1600, Port Elizabeth 6000, SOUTH
AFRICA

Dreyfus Amos

Hebrew Univ., Fac of Agriculture, P.O.B. 12, Rehovot, ISRAEL

Engel Martin

Apple Comp. Inc., 20600 Mariani Ave, Cupertino, CA 95014, U.S.A.

Feinstein Benjamin

Hebrew Univ., Agriculture Fac., 4, M. Cohen St., Rehovot 76424, ISRAEL

Freedman Debra

1843 East 32nd Str., Brooklyn, NY 11234, U.S.A.

Fredman Alice

ECCO, 1123 S.O.M. Center Rd. Mayfield Heights. OH 44124, U.S.A.

Gatis William

Educ. Div. ,Tandy Corporation/Radio Shack, Forth Worth Texas, U.S.A.

Gersh Sheila

11 Cranford Drive, New City, NY 10956, U.S.A.

Halbrecht Zvi

Kfar Hayarok, Ramat Hasharon 47800, ISRAEL

Hanke Manfred

Fac. of Educ., Nipissing University, P.O.B. 5002,
North Bay, ONT, P1B 8L7, CANADA

Harasim Linda

OISE, 252 Bloor St. Wesrt, Toronto Ontario M5S 1V6, CANADA

Harper Dennis

University Of the Virgin Islands, St. Thomas, VI 00802, U.S.A.

Harris Judith

Dept. Of Educ. Studies, University of VA, 621F Madison Ave
Charlottesville, VA 22903, U.S.A.

Hilgenfeld Robert

Jakarta Intern. School, P.O.B. 79/JKS Jakarta, Selatan, INDONESIA

Hurley Kathleen

Consultant, IBM Corp., 411 Northside Parkway, Atlanta, GA 30327, U.S.A.

Isom Steven

Fed. Proj. Off., Allendaly County Schools, P.O.B. 458
Allendale, S.C. 29810, U.S.A.

Jones Gordon

TTNS The Times Net. Sys., POB 7 214 Grays Inn Rd, London WC1X 8EZ, U.K.

Kurshan Barbara

Educorp Consultants, 4940 Buckhorn Road, Roanoke, VA 24014, U.S.A

Marchaim Uri
Migal Center, South Indust. Area, Kiryat Shmona 10200, ISRAEL
Morton Chris
Computer Curriculum Coord., Putnam/Northern Westchester Boces
Yorktown Heights, NY 10598, U.S.A
Newman William
Sadadeen Sec. College, Grevillea Drive P.O.B. 1219
Alice Springs, N.T. 0871, AUSTRALIA
Neuwirth Erich
Inst. Of Stat. and Comp. Sci., University of Vienna
Universiteitsstr. 5/9, A-1-10 Vienna, AUSTRIA
Nixon Willam D.
Educ. Techn. Branch, NASA Educ. Affairs Div., Nasa Headquarters,
Washington, D.C. 20546, U.S.A.
Nydal Goran
Swedish National Board of Education, S-10642 Stockholm, SWEDEN
Owen Trevor
Riverdale Collegiate Inst., 1094 Gerrard Str Esat, Toronto,
Ontario M4M 2A1, CANADA
Prilusky Jaime
Weizman Institute, Rehovot, ISRAEL
Regev Joseph
Ben Gurion University of the Negev, Beersheva, ISRAEL
Resta Paul
College of Education, Cnt. for Tech. & Edu./Univ of Mexico
Student Services Center B-87, Albuquerque, NM87131, U.S.A.
Riel Margaret
Education Consultant, AT&T Long Distance Learning Network
943 San Dieguito Drive, Encinitas, CA 92024, U.S.A.
Ringsted Mette
Distance Learning Center, Aarhus Technical College,
Halmstadgade 6, 8200 Aarhus N, DENMARK
Roberts Linda
Project Director, Congress of the United States
Office of Technology Assesment, Washington, DC 20510-8025, U.S.A.
Rogers Al
4021 Allen School Road, Bonita, CA 92002, U.S.A.
Roland Mark P.
Putnam Westchester Boces, Yorktown Heights, N.Y. 10598, U.S.A.

Sayers Dennis
Psychology Dept. Yale University, Box 11-A, Yale Station,
New Haven, Ct 06520, U.S.A.
Schmitt Bernard
Centre Lorrain D'Enseignement, Ban-La-Dame 54390 Frouard, FRANCE
Schrum Lynne
School Moder. for Mix, 293 Country Club Road, Eugene, OR 97401, U.S.A.
Scrogan Len
Princeton Schools, 25 Valley Road Princeton, NJ 08540, U.S.A.
Shor Richard
The Shomria Regional Secundary School, Mishmar Haemek 19236, ISRAEL
Sinclair Gerri
Excite Centre, Faculty of Education, Simon Fraser University
Burnaby, B.C. V5A 1S6, CANADA
Sligte Henk
University of Amsterdam, Grote Bickersstraat 72, 1013 KS Amsterdam
THE NETHERLANDS
Smith Richard
Dept. of Physics, University of West Florida, 11000 University Parkway
Pensacola, FL 32514-5751, U.S.A.
Spielvogel Robert
Learning Link National Consortium, 356 W. 58th, Str.,
New York, NY 10019, U.S.A.
Stout Connie
Div. Of Educ. Technology, Texas, Ed. Agency/1701 N. Congress Av
Austin, TX 78701, U.S.A.
Weintraub Hillel
School of Education Harvard University, Cambridge, Boston, MA, U.S.A
Wilton Ann
Computer Education, Peel Board of Education, 5650 Hurontario St.
Mississauga, Ontario L5R 1C6, CANADA
Winer Dov
Negev College Named on Pinhas Sapir, Kiryat Hachinuch Sha'ar Hanegev
D.N. of Ashkelon 79165, ISRAEL
Wolf Clancy
School of Education, Room 4208, 610 E. University, Ann Arbor
Michigan 48109, U.S.A.
Wright William
American Inst for Research, 1055 Thomas Jefferson St. N.W.
Washington, DC 20007, U.S.A.

AUTHOR INDEX

Abir A. 25
Alter M. 31
Annina R. 39
Applegate K. 49
Bieber J. 56
Biilman O. 255
Boucher T. 415
Bull G.L. 292
Calvin S. 61
Cameron J. 262
Carreras G. 67
Castells J. 67
Chapple D.K. 88
Charles J. 421
Chasid M. 72
Chow R. 148
Copen P. 125
Dreyfus A. 76
Engel M. 82
Feinstein B. 76
Fredman A. 267
Freedman D. 275
Gattis W.D. 93
Graif H. 226
Halbrecht Z.A. 99
Hanke M. 284
Harasim L. 289
Harper D. 290
Harris J.B. 292
Hilgenfeld R.M. 299
Hurley K.M. 305
Isom S. 432
Jager N. 101
Jones G. 14
Kurshan B. 9, 347
Laor H. 106
Lenk C. 114
Levy R. 226
Lodish E.K. 313
Longworth N. 136
Lund N. 321
Marchaim U. 119
Marks E. 209
Mojkowski C. 125
Morgan B. 49
Morton C. 125
Neuwirth E. 438
Newman W. 328
Nielsen N.C 166
Nixon W.D. 334
Nydahl G. 442
Offman Gersh S. 140
Owen T. 148
Porat I.M. 236
Prilusky J. 342
Quere M. 154
Regev J. 160
Resta P. 9, 347
Riel M. 193, 355
Ringsted M. 166
Roberts L.G. 13
Rogers A. 369
Roland M. 125
Sayers D. 378
Schmitt B. 154
Schrum L. 174
Scrogan L. 386
Shor R. 182
Sinclair G. 388
Sligte H. 186
Smith R.C. 202
Spielvoge R. 209
Stimmel J. 275
Stout C. 211, 396
Weintraub H. 403
Wilton J.A. 218
Winer D. 25, 226,230
Wolf C.J. 49 236
Wright W.W. 244